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THE MODEL ENGINEER

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SMOKE RINGS

Our Cover Picture

● IN THIS issue, there is an illustrated article on a well-known modeller, Mr. Norman A. Ough. Our picture shows Mr. Ough lining up the trunnion blocks on the cradle of a model of a Mark XII 6-in. naval gun, which he is building to a scale of ½ in. to 1 ft.

The barrel, correctly rifled, together with its carriage and pedestal, can be seen in the foreground.

An American Visitor

● MR. W. K. WALTHERS, the well-known American model railroad manufacturer and secretary of the Model Railroad Manufacturers' Association, is expected to visit this country at the end of this month. While here, he will address meetings of the National Model Railroad Association, British Region, in London on March 31st and in Leeds on April 7th.

Some enthusiasts in Scotland are making arrangements for a similar meeting to be held in Glasgow, primarily for all members of model engineering and locomotive societies in Scotland, on April 14th. The secretaries of all relevant societies who would like to send parties to this meeting are invited to get into touch with Mr. T. P. Hally Brown, 29, Waterloo Street, Glasgow, 2, who has the arrangements in hand. It is hoped to hold the meeting in the afternoon, so as to facilitate the return of visitors from outlying places such as Inverness, Perth, Dundee, Belfast, etc.

A Useful Wedding Present

● MR. D. ELWYN EVANS, hon. secretary of the Port Talbot, Neath and District Society of Model Engineers, informs us of a very pleasant function recently held by the society. The occasion was a dinner attended by members who, during the evening, made a presentation to Major John Bevan, president of the society, on the occasion of his marriage. The present took the form of a 3-ft. "cabinet" electric clock which had been made by members themselves; it is worked on the "trip" principle and could be used to drive several other small "slave" clocks. Each member was responsible for making an individual part. Power is derived from an ordinary cycle-lamp battery which is sufficient to keep the clock working for five months.

This was a very happy idea in that it not only serves as a tangible and lasting demonstration of esteem for a respected president, but it is one to which each member could feel that he had made a personal contribution.

News from Tyneside

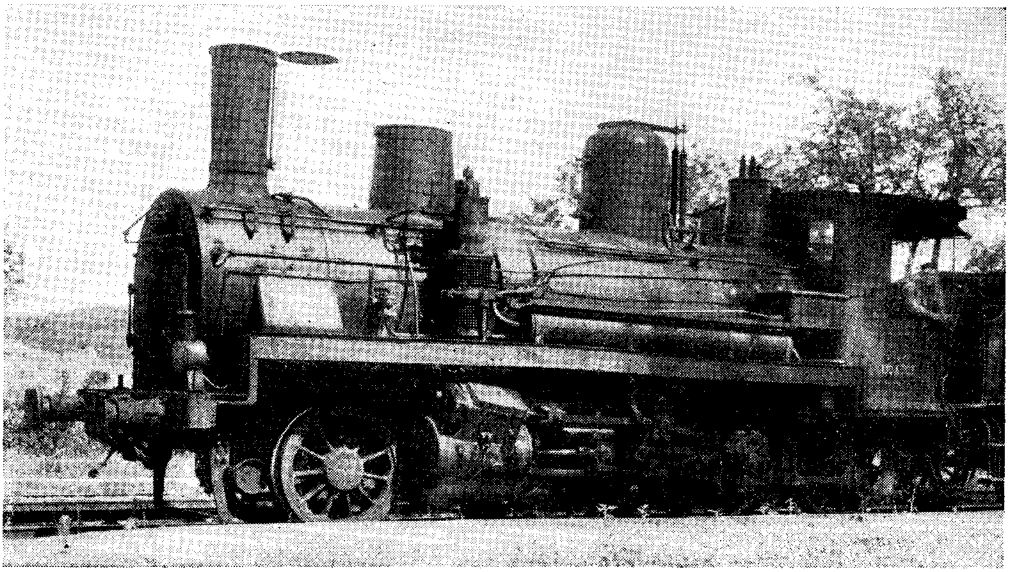
● WE WERE sorry to learn that Mr. Fred Reynolds has been obliged to resign from the position of publicity manager of the Tyneside Society of Model and Experimental Engineers. During his term of office, he certainly served the society well and ably, and his many friends will miss his genial way of carrying out his duties. He has been succeeded by Mr. R. L. Burgess, to whom we extend our good wishes for success.

Work on the society's multi-gauge track in Exhibition Park has been resumed with a view to the official opening in May, when Newcastle's Festival of Britain celebrations begin.

In connection with the local Festival, the society has been invited to provide a stand of representative models in the heavy industries section of the exhibition to be held in the new Engineering Department of King's College.

Pretty Creature !

● THE PHOTOGRAPH reproduced on this page is one of two recently sent to us by Mr. Michael D. Lavin, whose caption for the picture strikes us as being appropriate ! We will not discuss the question as to whether this engine would qualify for a locomotive beauty competition ; but, somehow, we find her rather attractive.



"That little something the others have not got !"

The engine is a 2-6-0, or Mogul, and is one of 30 built for the C. de F. Sud-Ouest between 1885 and 1892 ; so she is not quite so antiquated as she looks. The only other particulars that we have been able to discover are that she was a two-cylinder simple and her coupled wheels are 1½ metres, or roughly 5 ft. in diameter. For this information we are indebted to *Les Locomotives a Vapeur de la S.N.C.F.*, published by our esteemed French contemporary *Loco-Revue*.

Mr. Lavin took the photograph at Dordogne, Castelnaud-Fayrae, a branch line in south-west France, last September. The engine has given good service, judging by the shape of the running-plate and valance.

Restriction of Non-ferrous Metals

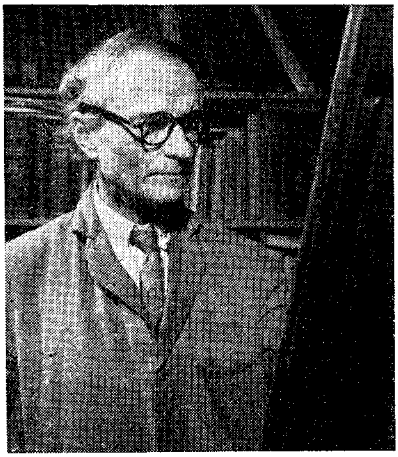
● THE BOARD of Trade and the Ministry of Supply have each issued an order prohibiting the use of copper, zinc and certain alloys of the two metals ; in view of the fact that, outside the trade, this prohibition appears to have caused some misunderstandings, we have obtained copies of the orders and from them we have extracted relevant information which we pass on to our readers in the hope of clarifying the matter. The orders became operative on March 1st last, but of the two, the Board of Trade order is the one which concerns the manufacturers who cater for the model engineering hobby.

The order states : No person shall incorporate any controlled material in any article mentioned in the Schedule to this Order : except (a) in the case of an article mentioned in Part 1 of that Schedule as a surface finish ; or (b) under the authority of a licence granted by the Board of Trade hereunder and in accordance with any conditions attaching thereto.

There is a clause providing for a limited exemption for work in progress and stocks in hand, extending the date of operation of the Order to July 1st. There is also a clause in which the expression "controlled material" is stated to mean : any metallic form of copper or zinc and any alloy containing one or both of those metals to the extent of 40 per cent. or more by weight.

Part 1 of the Schedule is divided into 16 sections, each comprising a list of goods to which the Order applies. Section 15 covers : Toys and Games containing more than 5 per cent. of controlled material by weight of the finished article, and in the list of seven items under this heading, the fifth specifies : Models and Model construction sets.

Copies of the Order can be obtained from H.M. Stationery Office, price 4d. each.

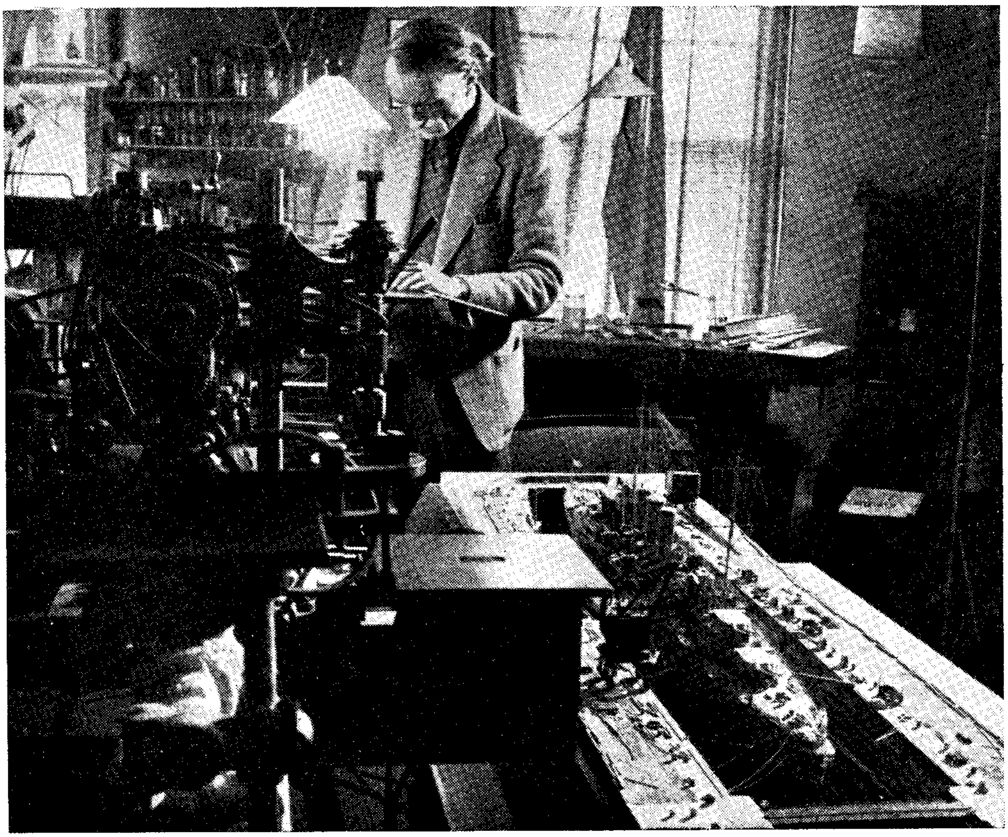


A study of Norman Ough at work on a painting

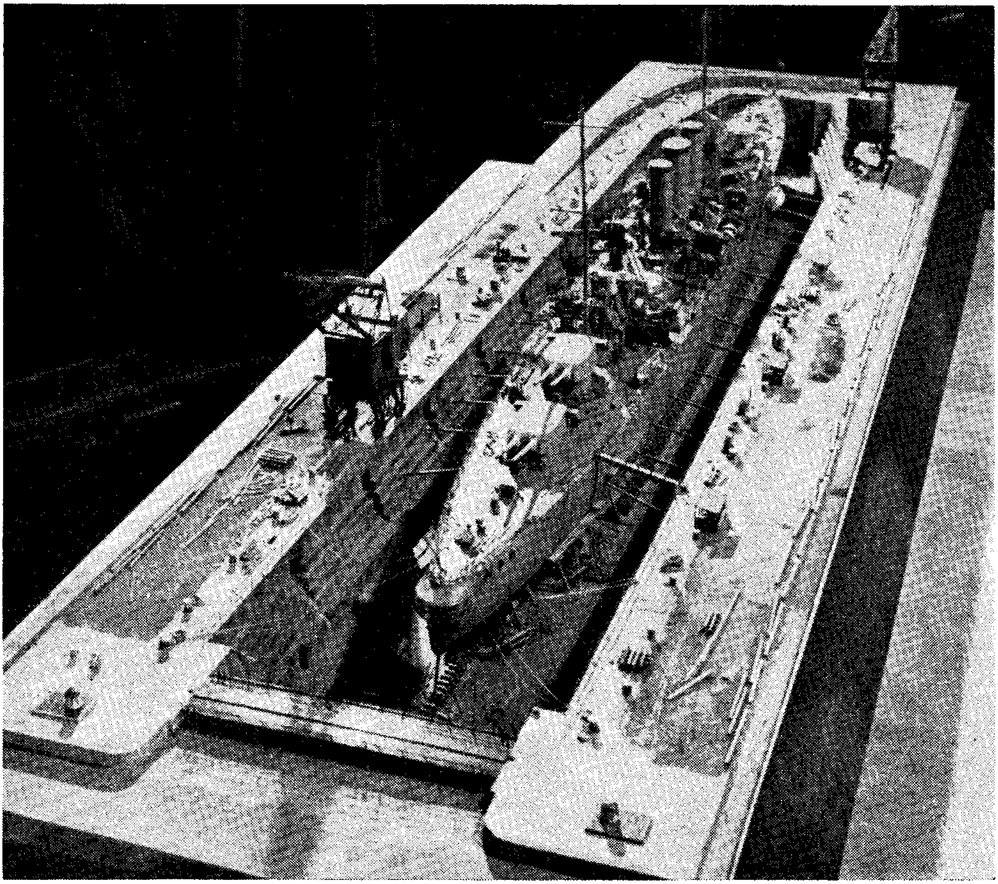
Model Engineers at Work
Norman A. Ough
by G. W. Arthur-Brand

THE lecturer laid aside his notes, the meeting drew to a close, and in the old engine-room of the R.S.S. *Discovery*, ship lovers gathered in small groups to talk of "ships and shoes and sealing-wax," etc.

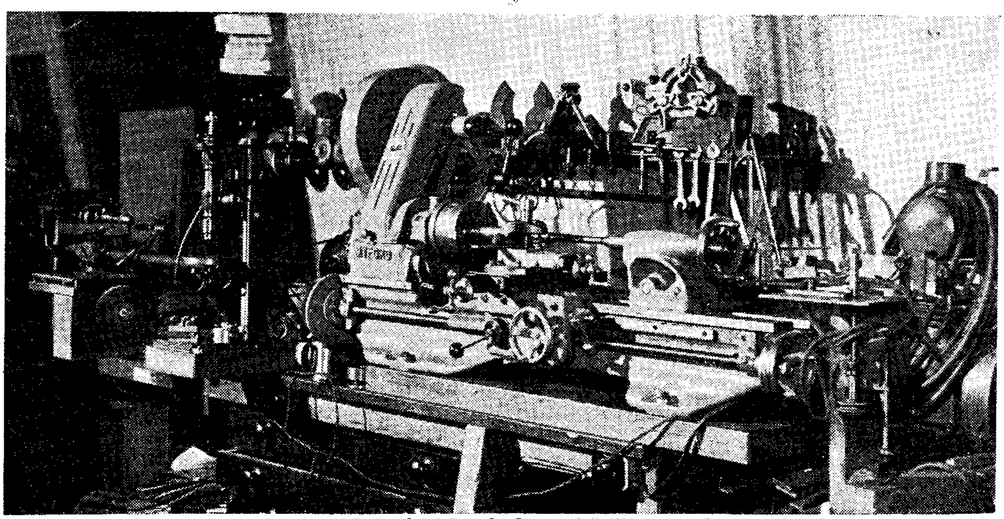
It was in one of these small groups that I first met Norman Ough. He had brought along with him a magnificent $\frac{1}{4}$ in. : 1 ft. scale model of a 16 ft. naval dinghy and although I had, like many readers, heard of the man and his work with unceasing regularity over a period of years, I had little realised the extent of his amazing ability. Some weeks later, I ascended the unlit stairs of a building in busy Charing Cross Road and knocked at a little door on the top floor.



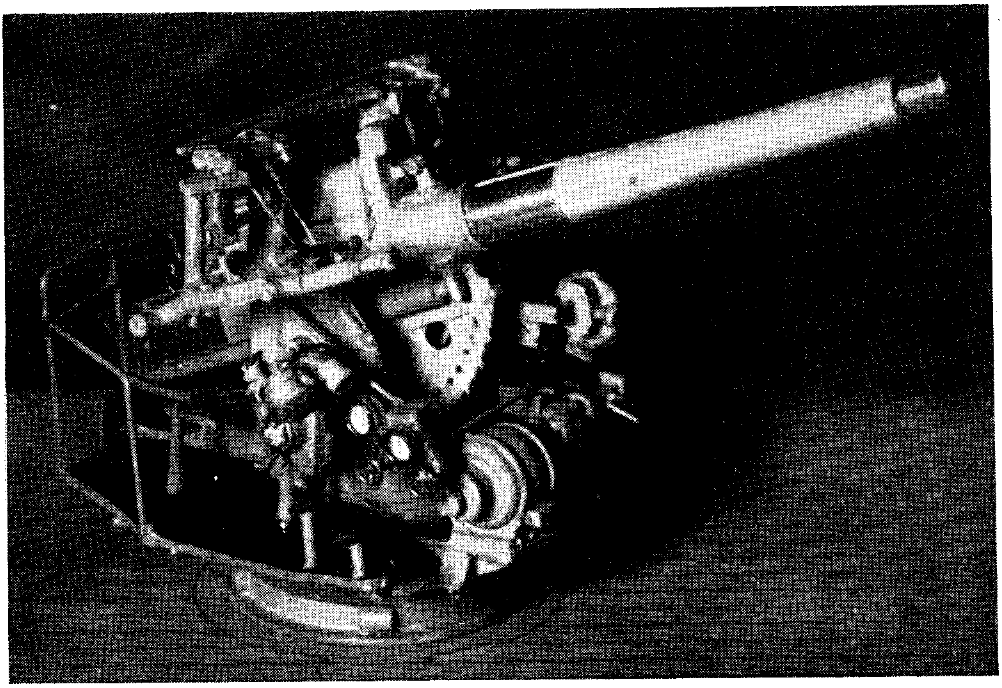
General view of workshop, showing model of H.M.S. "Dorsetshire" in No. 14 dock at Portsmouth Yard. Scale $\frac{1}{16}$ in. to 1 ft. for the Imperial War Museum. Taken when model was nearing completion



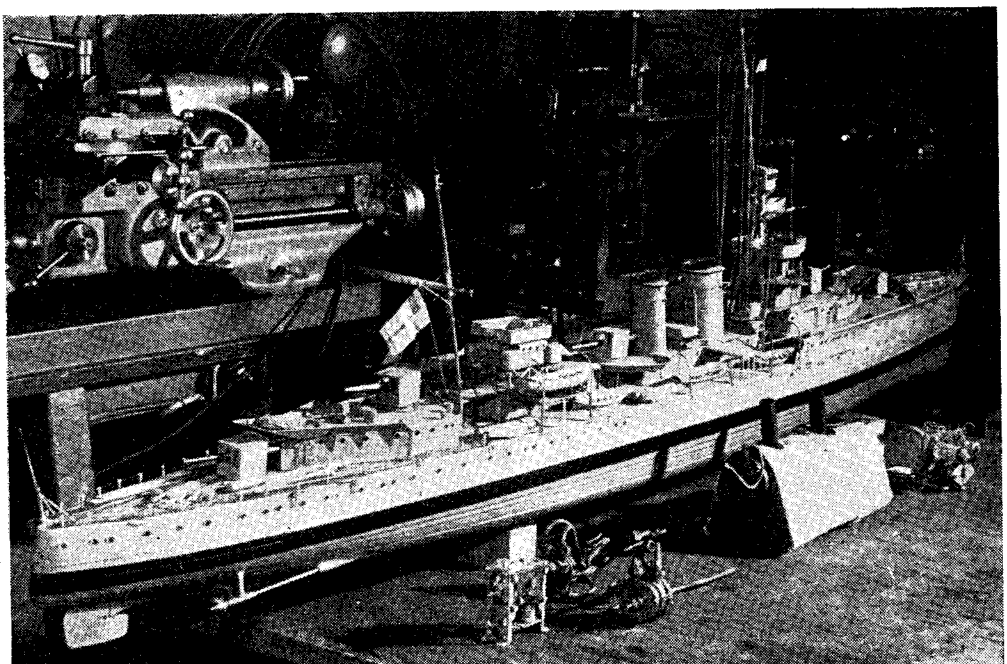
The " Dorsetshire " model completed



View of part of workshop, showing Myford M.L.7 lathe and drilling machine ; also, home-made surface grinder and spindle machine and compressor for spraying



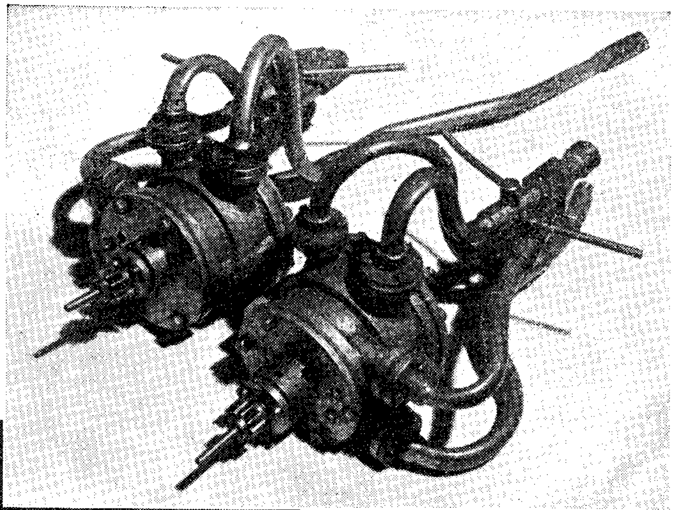
A miniature model (reproduced here approx. twice full size) of the Mark XIII naval high-angle gun, as carried in "Glorious" and "Courageous." Scale ⅛ in. to 1 ft.

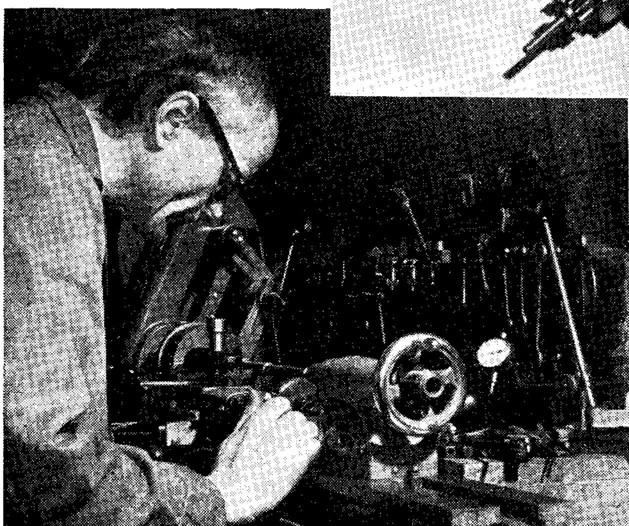


Working model of H.M.S. "Cuacoa," scale ⅛ in. to 1 ft. The semi-flash boiler and turbines are in the foreground and the actuator for radio control

Mr. Ough was born in London in 1898. He was first introduced to the sea and ships at the tender age of two, when he accompanied his parents to Hong Kong, where he spent the next four years of his childhood.

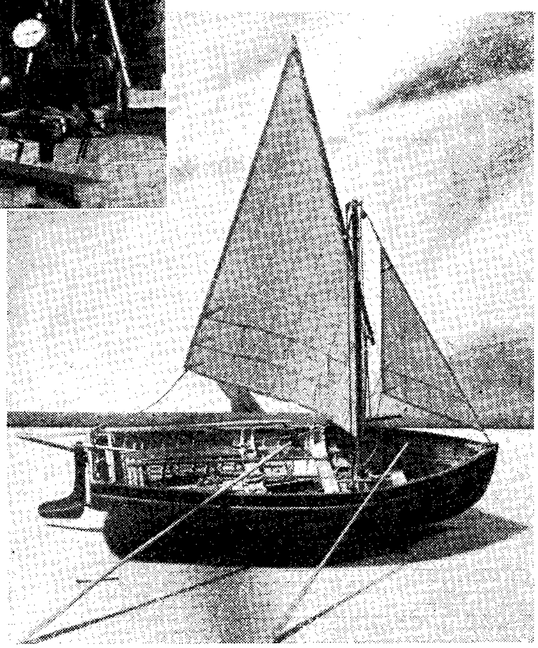
On leaving school, he attended the Exeter School of Art, and it was here that he started his modelling career in earnest. "But," says Mr. Ough, "my interest in models dates back a lot further than that; to between the ages of three and four years, as near as I can remember."





Above—Turbines (port and starboard engines) for model of H.M.S. "Cuacoa." The ahead and astern motors are on the same shaft in each engine. The larger end of the casing containing the ahead motion

Left—Machining the barrel of the 6-in. gun



Model made of Bristol board of a naval 16-ft. skiff dinghy. Scale ¼ in. to 1 ft.

The trail to the first rung of the ladder was undoubtedly laid by a working model of a sailing ship which the boy Ough used to sail in Dawlish Bay. This model appeared on view in the Exeter Museum, and soon after, he was commissioned by the Curator to do a series of models showing the development of ships through the ages.

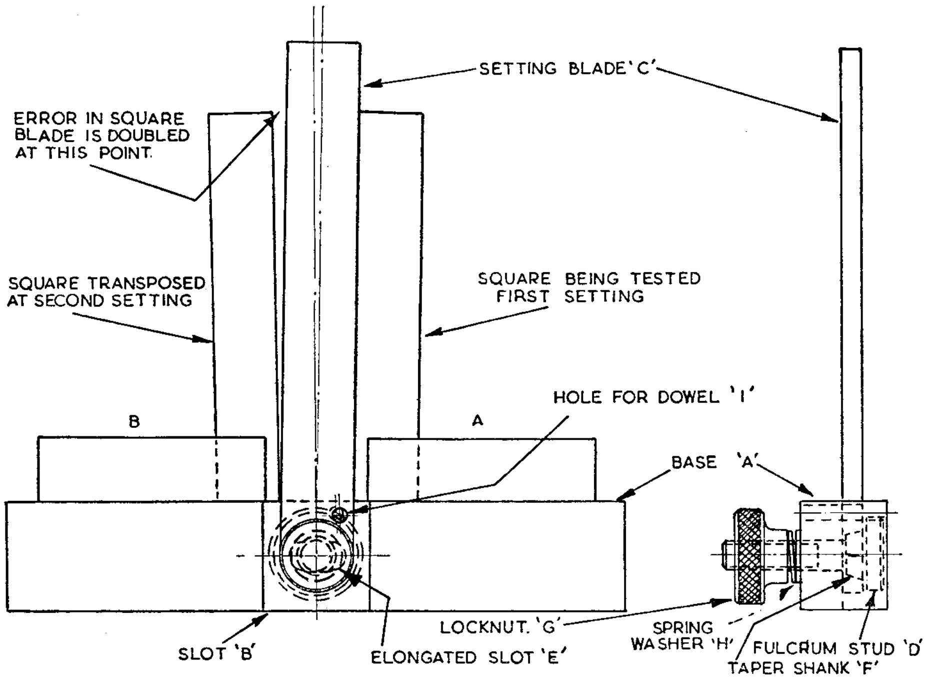
Ambition to reach still greater heights now brought Mr. Ough back to his native London, where he settled down to the job of completing a 100 ft. to 1 in. scale model of the Grand Fleet, comprising 151 ships which went into action at Jutland. The model was made specially for the naval section of the Government pavilion at the 1925 Wembley Exhibition, and was afterwards purchased by the Royal United Services Museum from whom further commissions were received to do a series of warship model and simultaneously to work for the Imperial War Museum. It was soon after this that he built a small model of H.M.S.

(*Continued on page* 378)

TRY-SQUARE TESTING

by W. H. Halliday

THE engineer will frequently find it necessary to check the ordinary try-square for accuracy and the exact squareness of the blade with the base. The accompanying illustrations depict an extremely simple, inexpensive, yet most useful precision gauging device designed to meet that purpose.



One very advantageous feature associated with the use of a gauge of this kind is that any error present in the try-square being tested will be magnified double in extent on the gauging tool. This, of course, enables a square to be checked and corrected within very fine limits in an exceedingly reliable manner.

Referring to the diagrams, showing a front elevation and end view of this gauge, it will be observed the tool comprises the following construction:

Member *A* is a mild-steel baseplate, made from any convenient rectangular standard bar stock. The overall length of this piece should preferably be about two-and-a-half times the length of the base portion of the largest try-square to be checked thereon. The thickness of this baseplate should also be not less than twice that of the base portion of the largest square.

On the front side of member *A* is the slot *B*. This extends in depth for about the thickness of the plate. The base of the slot is machined perfectly flat and parallel with the front and rear sides of the baseplate.

The length of this slot should be at least one-and-a-half times the width of the setting blade *C* which has to be affixed to the base of the slot and move relative thereto in a manner to be explained.

The baseplate *A* is hardened and ground on all faces for exact parallelism and flatness.

The setting bar or blade *C* in hardened mild-steel, which is also accurately ground on all sides for precision parallelism. One end of this member is rounded and drilled for the headed fulcrum stud *D* by which the blade is anchored to the baseplate *A*.

An elongated slot *E* is machined through the baseplate to allow the fulcrum stud a slight amount of longitudinal movement. The parallel threaded shank of the stud is provided with two opposed flats, after the usual fashion, to enable the stud to slide freely within the slot *E* but incapable of rotating therein.

The fulcrum hole in the end of the setting blade is tapered as at *F* (see broken lines in end view diagram) and the portion of the stud immediately underneath the head is made conical to suit.

These portions should be carefully lapped after hardening and it will be particularly necessary to allow a slight amount of clearance, i.e. about 0.008 in. between the underside of the head of the stud *D* and the top of the blade when the tapered portions are in close contact. This clearance will be necessary to allow the blade to be locked tightly against the base of the slot *B* and also to accommodate for any wear which may eventually occur between the fulcrum stud and the tapered hole in the blade.

A circular lock-nut *G* is screwed on to the projecting threaded end of the fulcrum stud *D* this being located at the rear of the baseplate. Encircling this portion of the stud shank, and interposed between the base and the lock-nut is the standard spring washer *H*. The purpose of this latter member being to impart a certain degree of tension to the setting blade after the lock-nut *G* has been released. During this stage the blade should move smartly but be entirely free from sideplay movement.

With the setting blade thus mounted to the baseplate and within slot *B*, it should be capable of being swivelled radially each side of the vertical axis of the gauge for about 5 deg. This requirement will give a sufficient amplitude of movement to the blade to cover quite substantial error in a try-square. It will also determine largely the length of the slot *B*.

The manner in which this simple setting gauge is to be employed is clearly depicted in the left-hand illustration.

First, the try-square to be tested should be rested on the top edge of the baseplate *A* on the right-hand side of the setting blade *C* in the manner shown at *A*. The setting blade will next be released slightly, by means of lock-nut *G*, and adjusted so that its right-hand edge will be uniformly in contact with the blade of the try-square, throughout the full length of that member.

This setting position may be tested in the usual way by feeler gauges, visual sighting by holding the tool before a strong light, or by means of pieces of tissue paper inserted top and bottom of the blade.

Having set the blade *C* correctly in contact with the try-square blade, it will be locked tightly to the base *A*.

Next, the try-square is transposed to the opposite side of the setting blade in the fashion shown at *B*. Whatever amount the blade of the try-square is out of true, will be shown doubled at stage *B*.

With the example depicted, the blade of the square is shown inaccurate to an exaggerated extent in order to illustrate more clearly the manipulation of the gauge, and the multiplication of such an error at stage *B*.

The gauge not only indicates the magnitude of any error but also shows in which direction this lies in respect of the base of the try-square.

With such a gauge, and using tissue paper 0.001 in. thick, it will be apparent a square may be tested easily and quickly within an accuracy of 0.0005 in. over the full length of its blade.

When correcting the face of the blade on the try-square it will be advisable to use blueing material on the adjacent edge of the setting blade *C* to ensure contact over the full surface.

In order to locate the setting blade *C* perfectly at right-angles to the top of the base member a small dowel *I* may be employed as shown.

This is situated in a drilled and reamered hole passing through the blade into the base. The dowel should preferably be of the headed type, so as to be readily detachable to allow for the radial movements of the blade during checking.

By mounting the shank of the fulcrum stud *D* within elongated slot *E* the task of matching up the try-square with the setting blade will be considerably facilitated, in a way not readily permissible if this stud were to be mounted in a perfectly round bearing hole.

With all the working members properly hardened and ground to precision limits on critical dimensions, wear will be maintained at a minimum, and long working life, and close accuracy be assured.

Model Engineers at Work

(*Continued from page* 376)

Queen Elizabeth for Lord Howe, who presented it to Earl Beatty at a reunion dinner.

From 1940 to 1945 Mr. Ough worked for film companies, constructing and supervising the construction of numerous models for use in films, including "Convoy," "Sailors Three," "Spare a Copper," "Ships With Wings," "Blockade," "San Demetrio" and "Scott of the Antarctic." Today his enthusiasm is as strong as ever, and when I called on him he was hard at work on yet another model.

The room into which I was admitted was a hive of industry. The accompanying photographs will show the mass of equipment and the business-like layout which characterises Mr. Ough's workshop. One of the most interesting points, however, at least as far as the majority of readers are concerned, is that a new M.L.7 is about the only piece of equipment which is not "home-made." The Mark XII 6-in. naval gun, for instance, incorporates a rifled barrel, and to carry out this operation it was necessary to design and make the appropriate tool. It should not, then, be difficult to imagine the number of similar interesting gadgets which have evolved from the four hundred-odd models which have, to date, been built by this stalwart.

Norman Ough, the man, is just what his portraits suggest. He has a capacity for prolonged periods of concentration, and among his interests, apart from model making, is philosophy. He thinks that it promotes an analytic habit which is useful in any kind of work. When I asked him why he had never married, his simple and immediate reply was, "I am too much of a model maker; I wouldn't inflict it on any woman."

IN THE WORKSHOP

by "Duplex"

85—A Fine-Feed Gear for the $3\frac{1}{2}$-in. Drummond Lathe

THE slowest rate of feed when traversing the saddle of the $3\frac{1}{2}$-in. Drummond lathe, and using the standard change wheels, is 174 turns of the mandrel for each inch of saddle movement.

With this rate of feed, difficulty may be found in producing a good turned finish unless the tool makes a rather wide area of contact with the work. But when a lathe tool of this form is used, a tendency to chatter develops, and in light lathes, at any rate, the resulting increase of radial pressure may cause irregular machining of the work. Therefore, to obtain a good surface finish as well as accurate machining, it is best to employ a tool having a limited length of its cutting edge in contact with the work, and at the same time, the rate of feed should be reduced so that the tool does not cut what amounts to a spiral groove or a fine screw thread. In commercial practice, where the aim may be to remove the greatest amount of metal in the shortest possible time, the rate of feed is closely related to the depth of cut, and these two factors are varied according to the speed of the lathe and the nature of the material being machined. On the other hand, the amateur worker, using a small lathe, quite commonly employs a rate of feed that is best suited for taking finishing cuts, and at the outset he hastens the removal of surplus metal solely by increasing the depth of cut. This method of working has the advantage that it can be employed successfully even in lathes of light construction, for then, instead of being radial, the cutting pressure is mainly in the direction of the lathe axis and so is taken against the mandrel thrust-bearing.

If the necessity for a fine feed is recognised, the next problem is to equip the lathe with an appropriate feed mechanism.

Clearly, this means that a further reduction of the feed gear ratio must be obtained either by adding another stage to the drive, or by introducing some form of worm gear. Worm gearing, however, needs an efficient lubrication system and its gear ratio is not easily altered. Although successful fine-feed mechanisms, incorporating a worm drive, have been described from time to time and we use one occasionally when cutting gear wheels, it was decided on the score of simplicity to add a belt-driven reduction stage to the existing train of change wheels. One great advantage of a belt drive in this situation is that in the event of an obstruction checking the saddle movement, or a chip jamming in the wheel teeth, no damage will be done, for the small belt merely slips on its pulleys and will resume work as soon as the obstruction is cleared. To save accidents, large lathes are sometimes fitted with a slipping clutch in the feed mechanism, and the small lathe is also the better for this safeguard which, however, must not form part of the screw-cutting gear.

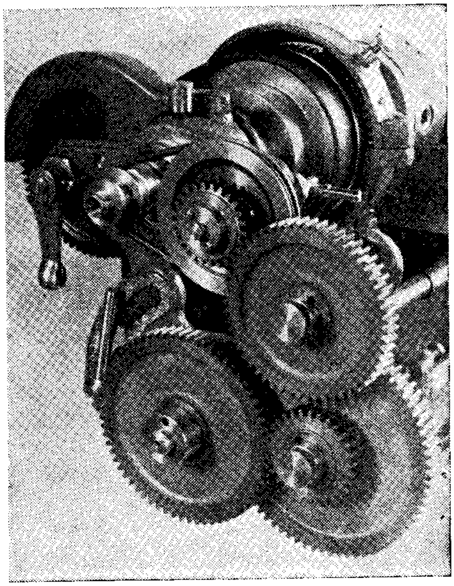


Fig. 1

In addition, the feed gearing is quite silent when driven in this way, and reversal of the direction of feed is easily and quickly obtained. Fortunately, the Drummond lathe has a lug cast on the headstock which normally serves for mounting an extra stud and wheel when cutting left-hand threads. This lug has been utilised for mounting a V-pulley driven by a belt from a small pulley attached to the lathe mandrel.

The small belt pulley replaces the ordinary mandrel gear wheel; this gear wheel is then carried on the same stud as the large belt pulley, and the two are connected by means of a driving-pin.

Now, as we have seen, the slowest feed obtainable with a gear drive is 174 turns per inch, but if the auxilliary belt drive gives a further reduction of 2.3 to 1, the resulting feed will then become 400 turns per inch when using a 20T-wheel on the belt pulley stud. This arrangement gives a saddle traverse of $2\frac{1}{2}$-thousandths of-an-inch for each revolution of the mandrel; this implies that the length of contact of the tool's cutting edge must be at least equal to this amount in order to produce a smooth finish on the work. By replacing this one wheel with another of

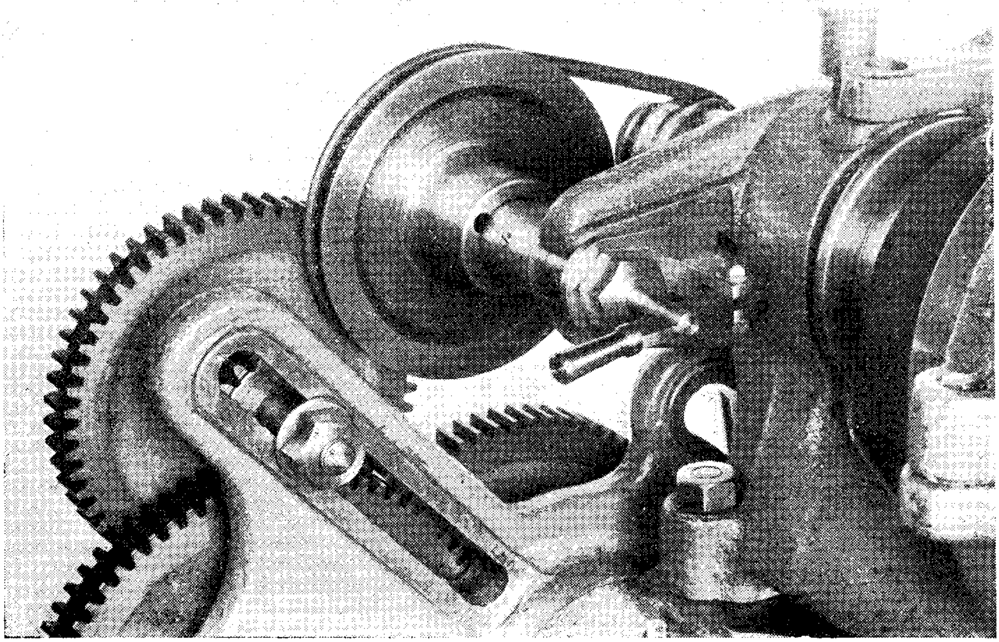


Fig. 2

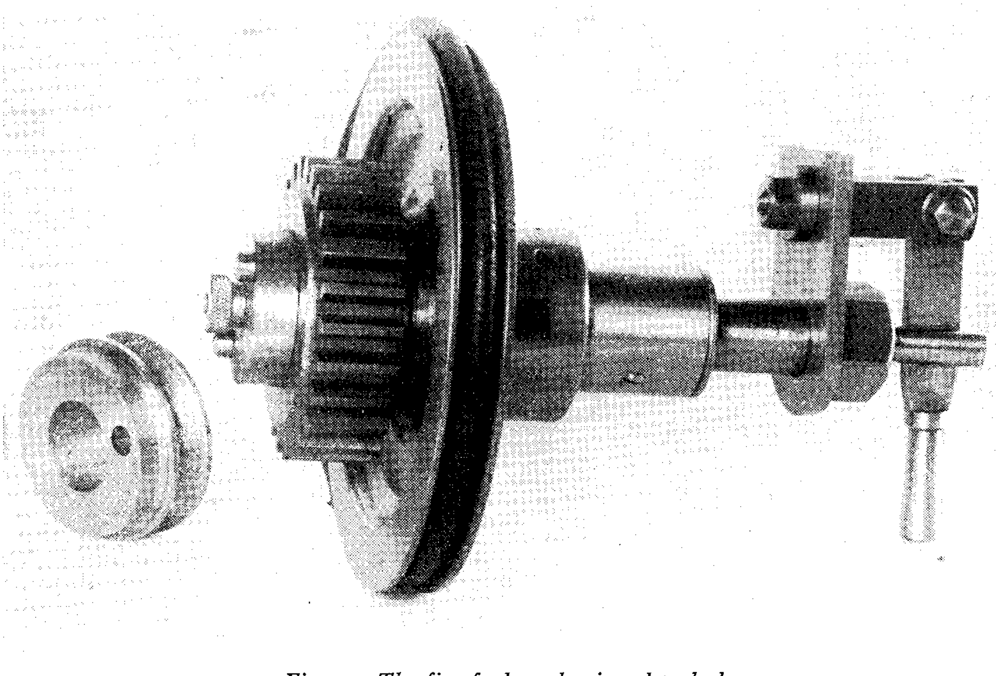


Fig. 3. *The fine-feed mechanism detached*

25T, 30T, 35T, or 40T, the final rate of feed will become 320, 270, 230, and 200 turns per inch respectively.

In the present instance, a 25T wheel has been fitted and the rate of feed obtained has proved satisfactory for all ordinary work, ranging from the rapid reduction in diameter of 2 in. round bars to the machining of 12-B.A. screws.

When first made, the attachment was of simple form and consisted essentially of two belt pulleys, of which the larger was carried on a long stud secured in the headstock lug already mentioned.

This arrangment will be described later in connection with a countershaft drive for traversing the saddle, with the lathe mandrel remaining stationary. Later, this pulley stud was redesigned to afford a quick and easy means of engaging and disengaging the feed gear, and it is this arrangement that will now be described.

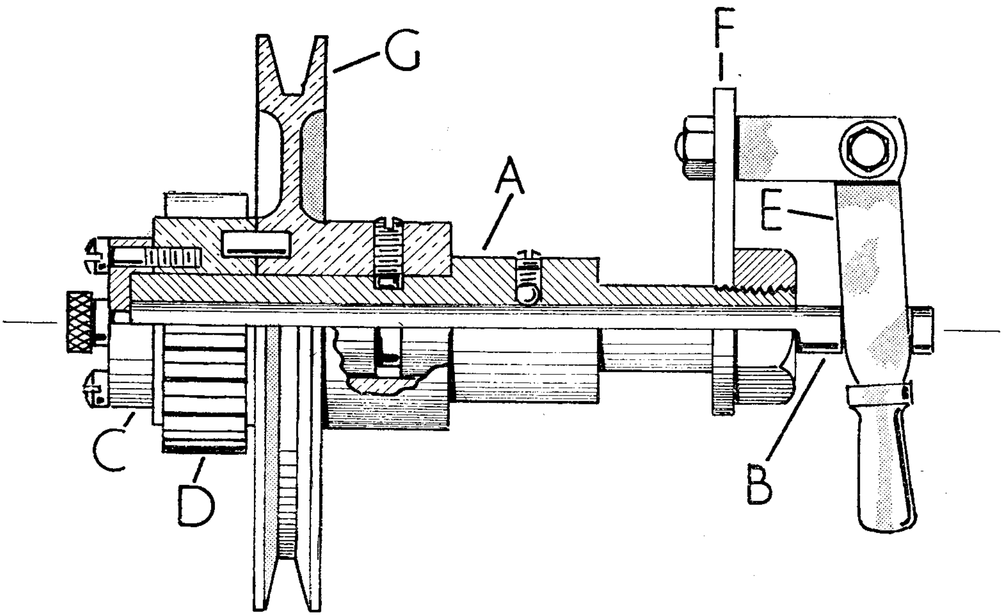


Fig. 4. Part-sectional view of the attachment. Reference letters correspond with those in Fig. 5

Construction of the Feed Gear

The gear train used is :

Reverse stud *1st stud* *2nd stud* *Leadscrew*

25T——> $\frac{55T}{20T}$ ——> $\frac{30T}{73T}$ ——> 65T

It will be noticed that this train varies from the makers' arrangement, for the positions of the 20T and 30T wheels have been reversed in order to gain additional space for the large belt pulley.

The body of the device, Figs. 4 and 5, *A* is machined to fit in the headstock reverse-stud lug, where it is secured by means of a nut bearing on the clamp plate, *F*.

In this way, the tension of the belt can be adjusted by sliding the body in the jaws of the lug. The body is drilled to take a small tommy-bar to enable the clamp-nut to be securely tightened, and, in addition, a spring-loaded detent is fitted to the body to provide a click-action for the control lever at either end of its travel. At its other end, the body is reduced to $\frac{5}{8}$ in. in diameter for mounting the large belt pulley and the 25T gear wheel. A $\frac{1}{4}$ in. diameter D-bit is used to machine the axial bore in the body through which the actuating-rod, *B*, passes.

This rod, consisting of a length of $\frac{1}{4}$ in. diameter silver-steel, has a slot filed at its right-hand end to provide bearing shoulders for the small control lever. At its other end, the rod is shouldered and fitted with a knurled finger-nut for engagement with the collar attached to the gear wheel. The collar, *C*, is secured to the gear wheel with two cheese-headed screws, but the gear wheel can be withdrawn by removing the knurled finger-nut.

The 25T gear-wheel, *D*, rides on the end portion of the body and is moved axially by the actuating-rod to engage or disengage the short driving peg shown in the drawings. This peg engages in a corresponding hole, or series of holes, drilled in the face of the large pulley; but, as this pulley rotates rapidly, there will be little delay in effecting engagement, even when only a single hole is used. The length of the projecting portion of the driving pin should not be more than 5/32 in., in order to restrict the range of movement necessary for the control lever. The handled control lever with its mechanism, *E*, is bolted to the clamp-plate, *F*; but, as the construction of these parts is quite straightforward, no explanation is needed; nevertheless, careful fitting is required to enable the lever to move the actuating-rod freely and without appreciable shake. The large belt

(*Continued on page* 384)

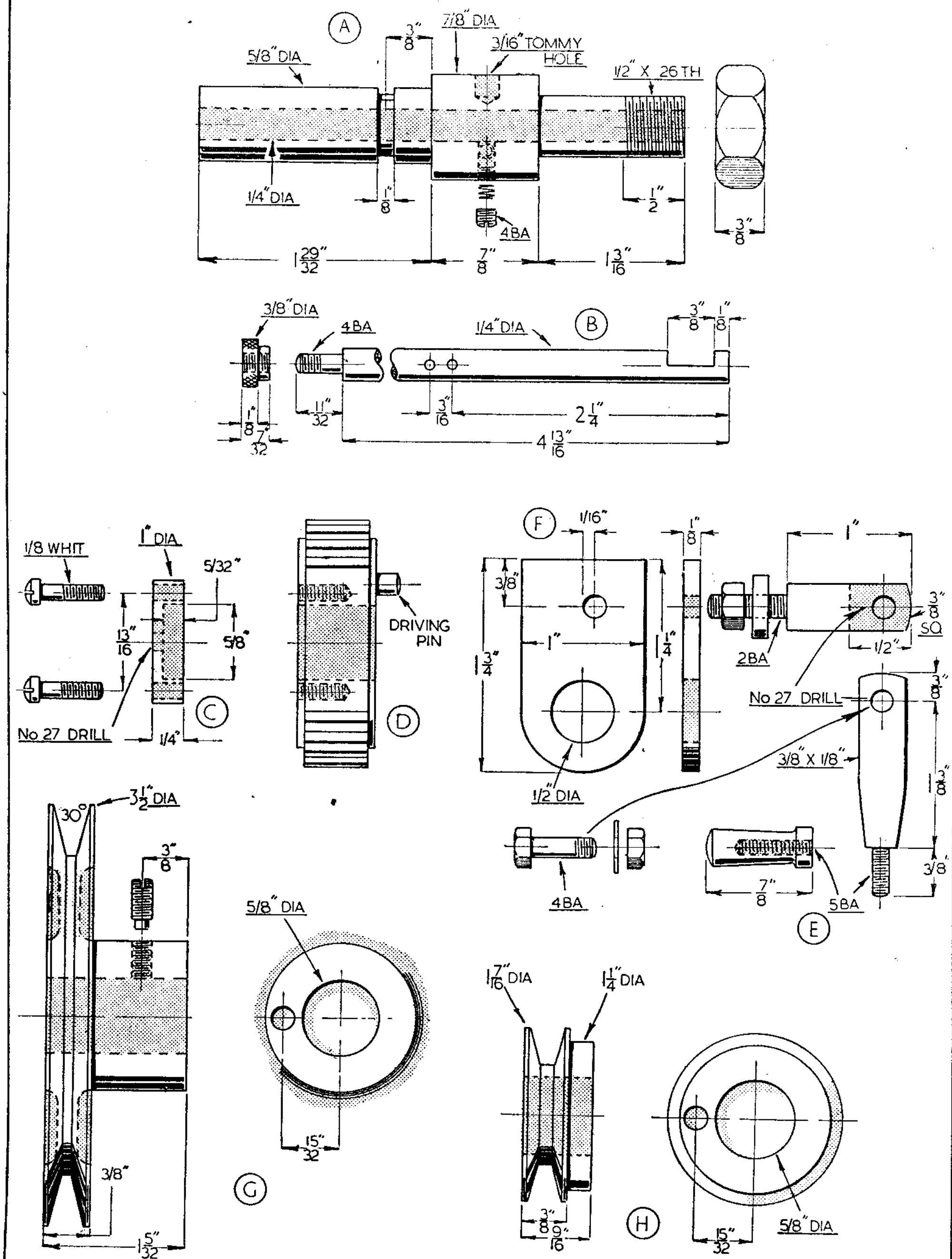


Fig. 5. " *A,*" *the body* ; " *B,*" *the actuating-rod* ; " *C,*" *the collar for the gear wheel,* " *D*"; " *E,*" *the control lever and bracket* ; " *F,*" *the clamp plate* ; " *G,*" *the spindle belt pulley* ; " *H,*" *the mandrel belt pulley*

Improvements and Innovations

No. 14—What Price Efficiency?

by "1121"

"EFFICIENCY" is a word so often misused by amateur engineers that its true meaning is frequently lost in the process. When somebody says: "So-and-so has built a very efficient engine," what he usually means is that So-and-so has built an engine which he has observed to knock spots off other engines in the matter of pulling heavy loads, or running at high speeds. We have, in fact, noticed "Locomotive Efficiency Trials" among the activities of certain model locomotive enthusiasts, whereas in actual fact these are not efficiency trials at all.

For the benefit of those unfamiliar with these functions, we will mention that they consist of attaching a certain known load behind an engine, which is then driven with great alacrity up and

down a track of a certain length. At the end of this performance, the number of trips completed in a given time, or the time taken to accomplish a stipulated number of trips, is recorded and worked into a formula together with the dimensions of the engine necessary for the calculation of its tractive effort—bore and stroke of cylinders, number of cylinders, diameter of driving wheels, and working boiler-pressure. From all this data it is possible to calculate the relative merits of the various engines concerned, the one showing the best performance, of course, gaining whatever award is being offered. Naturally, it is necessary to ensure that all conditions of track, trucks, etc., as far as possible, are constant for all competitors.

Now, this series of articles has, in the past, been the medium for a certain amount of criticism, sometimes in the form of good-natured leg-pulling, and sometimes treated more seriously. Let us state here and now, therefore, to avoid any misunderstandings, that we, in the unlikely event of anyone caring, are wholly in favour of these trials, *as far as they go*. To refer to them as "Efficiency Trials," however, we would respectfully point out, is a gross deviation from the truth, as we shall now endeavour to show.

The term "efficiency," as applied to a locomotive, means the proportion of the amount of energy put into it, in the form of fuel and water, to the amount that is got out of it again in the form of power available at the drawbar. The trials to which we refer measure the output from the engine, but take no account of what is put into it.

Now, supposing the secretary of our club brings an engine along to one of these trials, and moves a load of 500 lb. up and down the track ten times in twenty minutes. Everybody applaudes at this splendid performance, and the secretary beams his pleasure at the fact that in only fifteen years of secretarial duties he has found time to build a whole locomotive, which has given such a good account of itself.

Now the chairman comes along with *his* engine, and to the amazement of the onlookers, who know that its dimensions are precisely the same as those of the secretary's engine, succeeds in putting up exactly the same performance, but in *fifteen* minutes only. This time the crowd cheer themselves hoarse, as it is a foregone conclusion that when the chairman and his engine are put through the formula they will come out at the other end showing a 25 per cent. victory over the secretary. Hurrah! the chair-

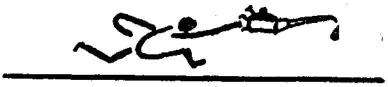
man has won the trials! And the whole assembly, consisting of the entire membership of the club and their wives, representatives of nineteen other clubs, the entire Model Engineering Press and several unidentified hangers-on accompany him to "The Wheeltapper's Arms," where he distributes half-pints among the multitude. One forlorn figure only remains on the field of conflict—that of the secretary, who is taking so long to drain the remaining water out of his tender, and shovel the unused coal back into the sack, that he has been left behind.

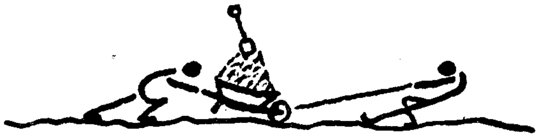
Nobody noticed that the chairman didn't have to empty *his* tender—he'd already done it while running—or rather his engine had done it for him, and far from shovelling back unused coal, he'd been exceedingly pleased with himself, towards the end of the trial, for having the forethought to put that extra handful in his overall pocket! We suggest that a little further simple calculation by the judges would have shown that in order to achieve his spectacular 25 per cent. clipping of the secretary's time the chairman had used 200 per cent. more coal and water! Who would like to say now which is the more "efficient" engine?

As we take our last glimpse of the secretary, tirelessly composing a reply to the gentleman who has written in to him complaining that the trials weren't fair because he wasn't allowed to give his engine a push to get it started, who should have had the award for the best engine—he, burning the midnight oil, or the chairman drinking it?

We know, appreciate, and applaud the fact that a large part of the idea behind these trials is to give the boys an entertaining afternoon out, as much as any serious collection of scientific data.

We suggest, however, that as much fun could be extracted from the process of handing half-a-pound of coal and one gallon of water to each competitor, and saying, "there you are—now see how far you can get with it!" We suggest that if something of this sort were included in the trial, or made the subject of a separate trial altogether, not only would an entertaining session be the result, but for the more serious-minded a lot of things would be learned about the capabilities of the various engines, *and their drivers*! We know—many such tests were carried out by certain members of the S.M.E.E. on a continuous track before the war; a condition was that the engine must finish its run with a good fire and workable level of water in the boiler—able, in other words, to be driven off without pause for a "blow up" or similar major operation—and the antics of some drivers to achieve another lap without flattening the engine were fantastic in the extreme!





No records were kept of the results of these tests, but we remember noticeable differences in the performances of any one engine when handled in different ways by different drivers—different speeds, different methods of firing, different cut-offs, etc., and between various engines handled in the same way by the same driver. We thoroughly recommend this idea to anyone desirous of investigating the *inner* virtues or failings of his engine, as distinct from the mere outward show of force—what kind of fire and what kind of coal the engine likes—how far it should be "notched up" at varying speeds—what is the best level of water in the boiler—*these* things indicate what faults there may be deep down in the design of the engine, and their rectification can only result in improvement in the more spectacular aspects of the engine's performance.

We may ask ourselves what is the point in this striving after efficiency—what does it matter if we *do* use a bit more coal or water than the next man, or if our engine won't come back to the last notch without kicking a bit—we're not tied down by operating costs, and if we *do* blow half our tender-ful of water out of the safety-valve there's plenty more where that came from.

The answer is in the previous paragraph—an engine, or for that matter any machine, can't be doing its best work if it is working inefficiently. Inefficient boilers can't supply all the steam required by inefficient cylinders—pressure drops, and bang goes your pulling-power. Inaccurate valve-gears and valves cause uneven beats; the engine's exhaust beat is of no importance in itself, but it's the engine's pulse, and from it the engine-doctor can tell that the engine is not developing its power as evenly as might be throughout the revolution of its wheels, and uneven power exertion causes slipping, and away goes your power again.

And it is only because all those funny-looking old codgers, who now stand about in the background watching our present-day engines on their trials, when they were young and inquisitive and ambitious and unbeatable, improved on each other's ideas, ferretted for faults in their own and worried the life out of their brass boilers and lead pistons, that we are able to have track trials, or even engines at all, today. Are we going to let them down now by saying our engines can't be improved, and refusing to bother our heads over thinking up some new gadget which can advantageously replace something on our engine which was only put there because it is there on all the engines we have ever seen? Should we win our locomotive trials by looking at each bit of our engine before we make it and thinking "can I improve on the way it was made last time?" or should we snuggle down in our comfortable little rut, sheltered from possible failure, with our motto as "trust in weight, and keep your sand dry?"

In the Workshop

(*Continued from page* 381)

pulley, *G*, is turned from an iron casting, and is fitted with a shouldered grub-screw which engages in a groove, turned in the body, to provide end-location and so keep the pulley from moving axially when the gear wheel is disengaged. This screw may be removed for lubricating the wheel bearing. The small belt pulley, *H*, which can be turned from steel bar, is secured to the lathe mandrel with the standard knurled nut and driving peg. As already described, the ratio of the pitch diameters of the two belt pulleys should be approximately 2.3 to 1 in order to give a drive of 320 turns per inch with the 25T wheel fitted. When the parts have been assembled, the detent for the actuating-rod is removed to enable the rod to be marked at either end of its travel; these marks are then spot-drilled, as shown in the drawing, to form recesses for the spring-loaded ball-detent. A length of sewing-machine belt is used for the drive, and the scarfed joint is secured by cementing and then stitching along the line of the joint.

If, instead of a leather belt, a stout rubber band is slipped over the pulleys, enough grip will be obtained to drive the gear train under the conditions of very light loading imposed; moreover, a belt of this sort can be crossed to afford a quick and easy means of reversing the direction of the saddle traverse.

(*To be continued*)

The Mechanical Aspect of Radio Control

by A. M. Colbridge

RADIO control for models is not as new as many people appear to imagine. It is, in fact, almost as old as experimental amateur radio itself. It is the *commercial* model radio control unit which is a post-war development.

The first successful commercial units to appear in this country were brought out in the middle of 1948—the Mercury-Cossor unit being one of the most interesting new "trade" items of the "Model Engineer" Exhibition of that year. Since that date several other commercial sets have reached the market, currently there being a choice of some half-a-dozen different makes.

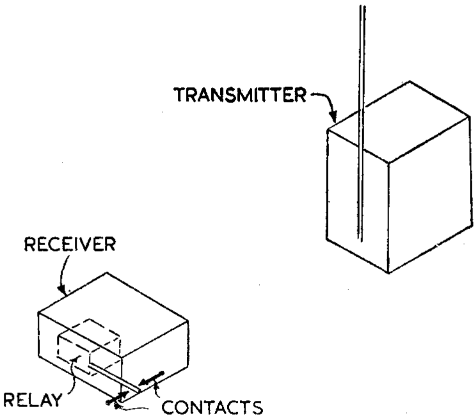


Fig. 1

Now the modeller's attitude towards radio control is governed largely by his knowledge of, and experience with, radio itself. For the purpose of this article we are concerned not with the radio expert but with the modeller who starts with virtually no knowledge of that subject. The radio control unit itself is then simply a piece of apparatus enabling power to be applied, under remote control, to certain controls on the model. He is, in fact, more concerned with the working of the actuator or servo mechanism contolled by the radio. The radio is simply a piece of apparatus which switches on and off the servo mechanism in response to a similar "on-off" signal at the transmitter end.

Successful radio control operation, then, presupposes that the radio gear itself is reliable, and is capable of being set up and adjusted by following a set of instructions, like any other piece of mechanism. Given such instructions a certain (test) action should produce a certain result. Provided such is so then the whole radio control unit is capable of successful operation by the non-radio-minded modeller, until such time as a fault occurs.

In general, this attitude towards radio control is capable of producing successful results, thanks largely to the good degree of reliability current with modern receivers and transmitters. The transmitter itself should be, and in fact is, largely trouble-free. The receiver is the most likely source of failure, but provided no basic fault occurs should still give working results with "mechanical" maintenance and adjustment. By "mechanical" we mean largely the following of the instruction manual rather than an appreciation of the theoretical workings.

Where this method of operation can fall down is that lack of electrical knowledge may render the unit inoperative whereas the fault is a very simple one and corrected in a matter of seconds with that knowledge. Unfortunately, there is no short cut to becoming a radio expert, and so the non-radio modeller who wants to use radio control for his models must either accept that fact or be prepared to learn the hard way—by experience. Ideally, his best approach is to enlist the co-operation, or at least have a call upon, a radio expert who can help him solve the more technical problems as they occur. Failing that, his only other solution is to return non-working

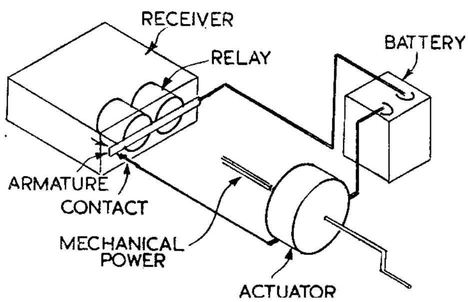


Fig. 2

equipment to the manufacturers for adjustment or repair. As likely as not the fault will be a simple one and the resulting delay as bothersome to him as to the manufacturers in having merely a badly adjusted set to set up again and return. It is no secret that many brand new sets returned by indignant customers as "quite useless" have been replaced by another new set and the original "faulty" set merely set up properly, checked and sold to the next customer, who has had no difficulty in getting perfectly satisfactory results from it!

Like all novel equipment, however, the competent modeller who is no radio expert, but wants

to take up radio control will soon master the basis of operation and achieve a satisfactory working pattern. In other words, he will be capable of getting consistent results merely by intelligent application of the instructions and soon only the more obscure faults will floor him. Very few of the modellers who do successfully operate radio control models, in fact, could claim any specialised knowledge of radio. They have merely picked up a working knowledge of the subject as they have gone along. This, in fact, is about the only method which is likely to lead to success in such cases. No intermediate study of electronics is likely to prove directly helpful. The subject is so vast and the model units so specialised that practical solutions are the invariable rule.

Initially, therefore, we will regard the radio control unit as two switches, one controlling the other by radio frequency transmission (Fig. 1). Operating the transmitter switch or "control" causes a corresponding change in the receiver which has a purely mechanical result in operating, or releasing, a relay. This relay operation is represented in the form of mechanical switching by the armature of the relay (or one side of the "switch") changing from one contact position to another, as shown.

Thus, radio control in its simplest form offers nothing more than a remote control switch, as afforded by the receiver relay. This switch then becomes part of the actuator or servo

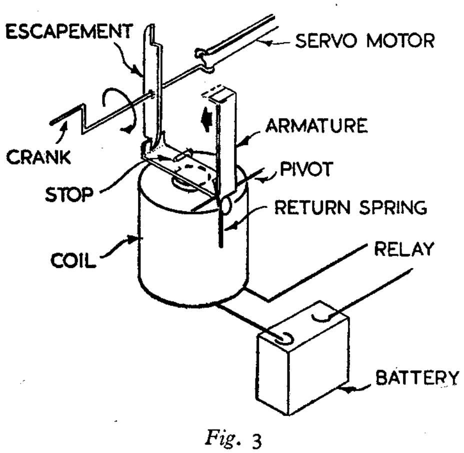


Fig. 3

mechanism circuit in the model. It is this circuit which is used to operate the control or controls of the model. The receiver itself, therefore, comprises two separate circuits. The radio circuit including the relay coils—and this is the circuit we hope will not go wrong!—and the actuating circuit comprising the relay armature and contacts, the actuator mechanism itself and power for the actuator (Fig. 2.) The actuator circuit is a simple one, very easy to understand and trace for faults. The linkage between actuator itself and the control surface is purely mechanical. Assuming a satisfactory degree of reliability from the self-contained radio receiver circuit the ultimate success of the installation is dependent upon the successful electrical and mechanical operation of the actuator circuit and its attendant mechanism. From this point onwards, therefore, the solution is well within the capabilities of any competent model engineer.

The actuator itself is nothing more than a device for translating the switching action of the relay into mechanical movement. No direct coupling to utilise the mechanical movement of the relay armature itself as a source of servo power has proved fully successful, although many such schemes have been tried. Theoretically this is, in fact, the simplest solution, but there are many practical objections. The usual, in fact almost the standard method is to use a simple

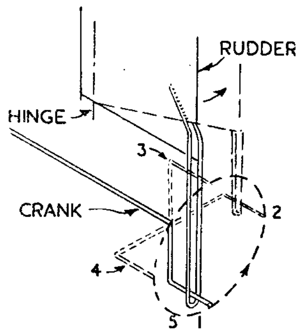


Fig. 4

mechanical escapement controlled by an electromagnet (Fig. 3). The coil windings, plus a suitable battery as a source of electric power, with the relay contacts as the "on-off" switch complete the electrical circuit. The separate mechanical linkage is controlled by an L-shaped armature. To derive mechanical power by this means, and indeed to get operation at all, the mechanical side must also have a source of power. Generally this is a rubber band motor, although a a clock spring has also been used. The rubber band motor is, however, superior, for it is capable of being wound to take many more turns than a comparable clock spring, and is readily replaced in case of breakage. This servo power not only operates the escapement but provides the power to operate the control surface of the model.

A simple actuator of this type is shown coupled to a rudder in Fig. 4, and the sequence of operation is indicated. With the actuator circuit "open" the coil is not energised and the escapement is in a "neutral" position—1. Closing the circuit (i.e. the receiver responding to transmitter signal), the coil is energised, pulling the armature in which releases the escapement allowing it to rotate through 90°. This produces a corresponding rotation of the crank extension, turning the rudder to maximum offset. As long as the circuit remains closed the control surface remains in this position. In other words, servo battery *current* is being used up all the time a control position is held on. Break the circuit once more, the escapement rotates another 90° to neutral again. Similarly, the next step is full opposite rudder, releasing to neutral once more.

This is simple sequence control, the corresponding positions being :—

Neutral—no actuator current drawn.
Right rudder—drawing servo battery current.
Neutral—no actuator current drawn.
Full left rudder—drawing servo battery current.
Neutral—no battery drain.

The actuator, too, is self-neutralising. That is to say failure of the servo circuit, releasing the escapement from a " hold " or control position, or failure of the transmitter signal or receiver

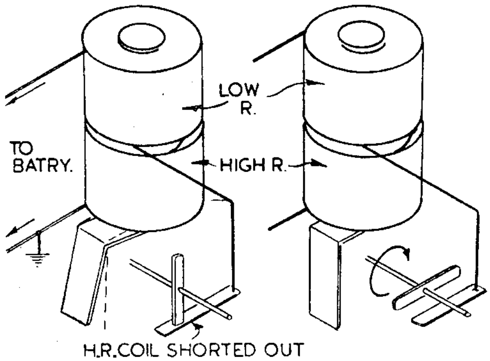


Fig. 5

response, returns the control to neutral. The advantage of this is obvious. This type of mechanism is, in fact, the one most commonly employed. The servo power, the rubber band, can be of sufficient strength to drive almost any linkage, although there are disadvantages to making use of this fact. It is usual to make the linkage as light and free as possible so that only minimum power is required to move the control-surface. Excessive power from the servo motor means excessive tension or pull on the escapement arm which may cause this to bind. Where more servo *power* is absolutely essential it is better to arrange this by suitable linkage rather than direct power from the servo motor.

The type of actuator commonly employed is designed to operate off 3 to 4.5 V. Coil resistance is of the order of 8 ohms when the current drain is 40-55 mA. This is the type of current drain a small dry battery is capable of giving for limited periods only. In model aircraft work, where light overall weight is essential, it is usual to employ pencells (two pencells = 3 V = 1 oz. ; three pencells = 4.5 V = 1.5 oz.) and discard these frequently. Holding on any control position would flatten the servo batteries in something less than one minute. In other installations, such as a boat, this problem is not so acute for larger batteries may be used. Weight in such cases is not so important.

There is a modified form of the simple actuator, however, which has given good results. This employs a split coil giving high current drain only momentarily to pull the armature in. Once the armature has moved in close to the pole piece considerably less attraction is needed to hold it in position and this fact is used to advantage by arranging that the inward movement of the armature switches a second coil in series with the original coil so that the total coil resistance in the " hold " position is in the order of 30 ohms and current drain when " holding " a control position is reduced to the order of 10 mA (Fig. 5).

Some actuators of this type are susceptible to vibration. Motor vibration tends to bounce the armature away from the pole piece under the " hold " current power and let the escapement slip. In extremely bad cases the armature will chatter and the escapement skip continuously. This can be a fault of design as regards the coil values themselves, or the switching arrangement. An overstrong armature return spring is another possible cause of trouble. Most of the commercial split-coil actuators are satisfactory, however, although they can be upset by bad handling. The cause of the fault, however, is generally obvious after a careful study.

Now utilising the principle of sequence control it is readily possible to increase the number of control positions. Using a four-arm escapement* for example (Fig. 6) we *could* get the following sequence :—

Neutral—no current drain.
Half right—using servo current.
Full right—no current drain.
Half right—using servo current.
Neutral—no current drain.
Half left—using servo current.
Full left—no current drain.
Half left—using servo current.
Neutral—no current drain.

This actuator now uses no current in the " full " rudder positions, but it is not self-neutralising. Releasing to a neutral escapement position produces either neutral or full control position to one side or the other. At the same time it has the advantages of " half " control positions.

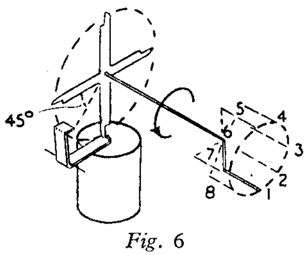


Fig. 6

In theory this is a very satisfactory set up. It is only necessary to remember the correct sequence and any desired control position can be found. In practice it suffers from two inherent disadvantages.

The first is that it is difficult enough to remember simple right-neutral-left-neutral sequence with just push button control. Any form of sequence control employing more than this simple four-position cycle necessitates some form of control box or rotary switch for visual indication of the sequence position from the transmitter end. Otherwise the operator will soon lose the

* *It is actually normal practice to use a four-arm escapement in a similar manner to the two-arm escapement.*

sequence of operation. Such a control box is not difficult to make. It is, again, a mechanical problem. A suitable form might be as in Fig. 7 where the diagonal positions correspond to transmitter signal "on" (servo circuit closed) and the other positions to "off." Note that this box is *not* marked out in control positions, i.e. full right, half right, etc.

There is a very good reason for this—the second inherent fault of multi-sequence control. This is the possibility of the relay, or the actuator, "skipping" and either missing a transmitter pulse or completing an involuntary movement. Such things do happen in practice, sometimes due to vibration, sometimes due to faulty switching and sometimes for no apparent reason at all.

If the servo gets out of sequence it is obviously necessary to re-synchronise it as soon as possible which can best be done by selecting a comparatively innocuous control position—such as half rudder—watching the response of the model and re-aligning the box accordingly. Unfortunately, there will be two alternatives and a second check position will have to be tried to ensure that the control box is correctly aligned. All this takes time and if for any reason the set-up is prone to skipping, re-synchronisation may be necessary so frequently that the scheme becomes useless. More time is spent trying to synchronise the control box than in affecting useful control on the model.

Primarily for this reason multi-sequence controls have not found favour for model aircraft. Delays can be dangerous and loss of control, or the wrong control applied near the ground, can wreck the machine. In a boat there is little likelihood of such extensive damage and a skipping multi-sequence control is more of a nuisance than a danger. Boats, too, are seldom subjected to the same degree of rough handling and vibration as are aircraft and so for simple multi-position controls the multi-sequence actuator has a certain attraction.

This does not mean that the simple actuator for model aircraft use is limited to just rudder control, full right or full left. There are very many ingenious arrangements, some remarkably successful. They are too detailed to describe fully here, but the principles of one or two will be dealt with briefly.

First, we might mention the four-arm, low-drain escapement for simple rudder operation. This is like the four-arm eight-position escapement of Fig. 6, but each operation only trips that respective arm of the escapement. Momentarily

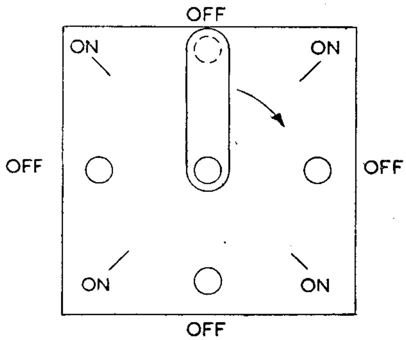


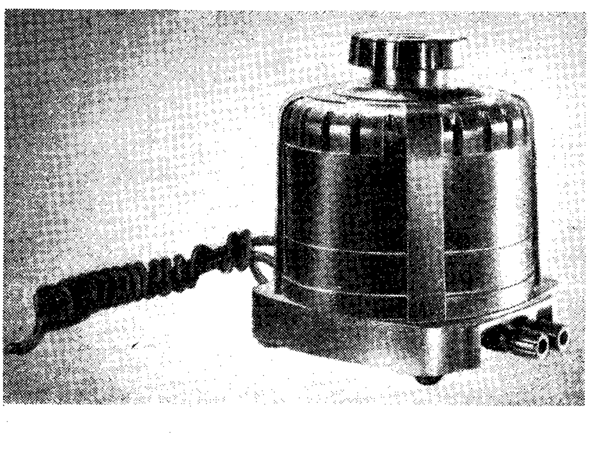
Fig. 7

current is taken by the coil to draw the armature in and release the escapement. Immediately the current is switched off again, releasing the armature to trap the next arm of the escapement after it has rotated 90°, when it is held. The escapement has thus been tripped and rotated through 90° and held there indefinitely (until released by another current pulse) with only a momentary expenditure of current. There are also variations of this scheme giving a self-neutralising action.

(*To be continued*)

Philips Variable Transformers

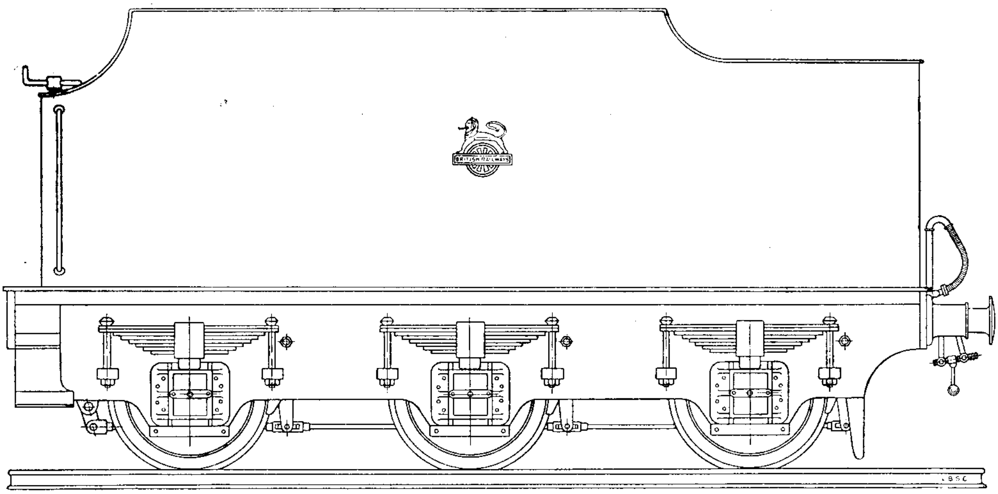
We have received from Philips Electrical Ltd., Century House, Shaftesbury Avenue, London, W.C.2, particulars of the new Philips variable transformers, which are built on the auto-transformer principle, and are available in ten different types, varying in output from 130 v/a to 2,080 v/a. Certain types intended for bench work have a safety device in the brush lead, and are supplied with spare fuses, but those intended to be built into existing apparatus have no safety device, as it is assumed that the apparatus is already safeguarded in other ways. These transformers are fitted with a graduated scale and knob, and include secondary voltage varying from 0 to 20 per cent. above nominal primary voltage. They have a high efficiency and the graduated scale permits them to be regulated to a fraction of a volt. The regulation is constant owing to the low voltage loss.



"PAMELA" by "L.B.S.C."

A 3½-in. Gauge Rebuild of a Southern Pacific

As we have now transformed our little *ex*-spam-can into something that really looks like a worthy member of the locomotive tribe, instead of an object you might dream about after a late supper of cold meat (if available !), sour pickles, and a pint of "wallop," we might as well provide her with a tender to suit. A small replica of the ungainly contraptions that trailed along behind the original boxes of tricks, would be very much out of place. There are two alternatives ; builders of *Pamela* who have a leaning toward the old L.M.S., might care to provide her with a tender of L.M.S. pattern, which would be quite in order, in view of the fact that we used some L.M.S. Class 5 components in the "rebuild." As a matter of fact, I placed the outline drawing of *Doris's* tender, behind the ditto of *Pamela*, and the combination looked very well indeed. On the other hand, the all-Southern fraternity will probably prefer a tender distinctly reminiscent of that line ; and in order to please them, I have drawn out a tender similar to those designed by Richard Edward Lloyd Maunsell, of beloved memory. I shall always remember the joke he made in my own workshop, about my *Caterpillar* 4-12-2 breaking down all the Southern bridges, and hauling 500-wagon trains when they hadn't a siding long enough to take one half that length !

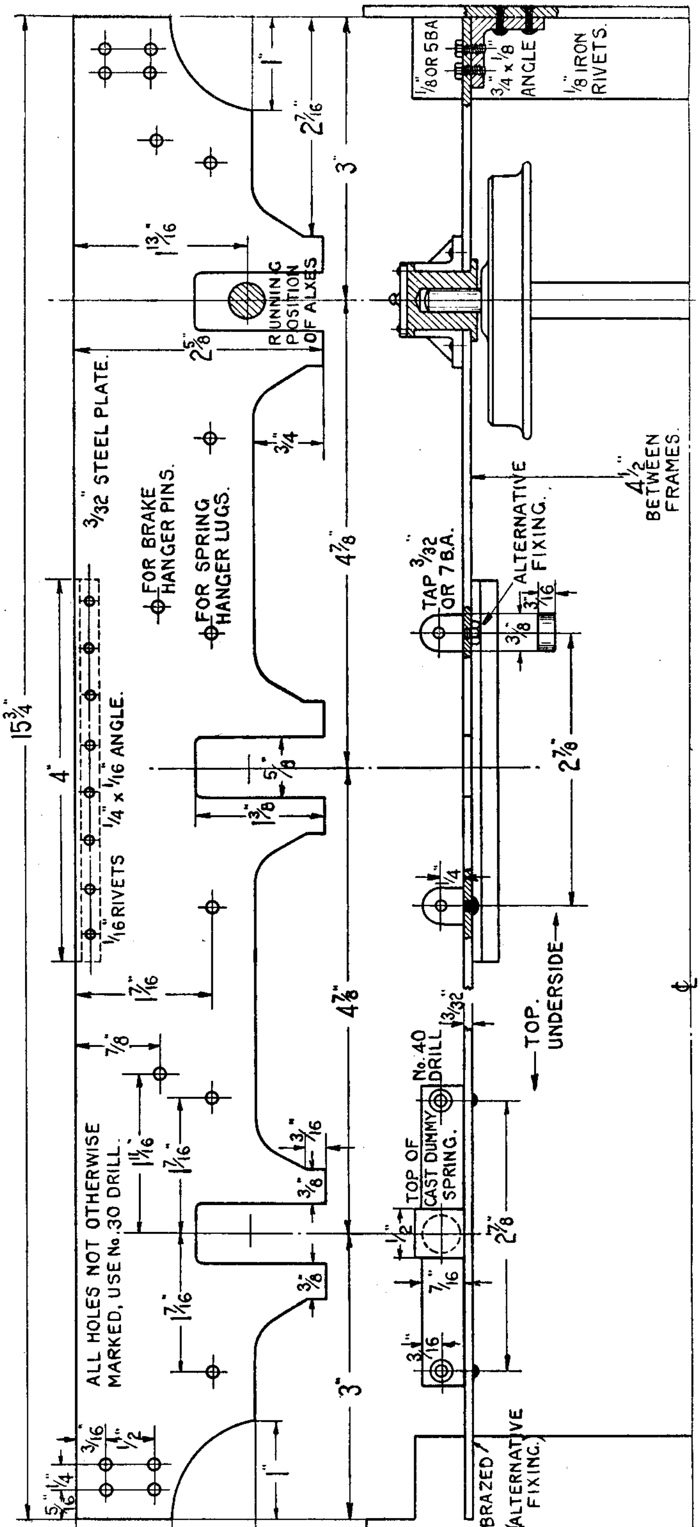


General arrangement of tender for "Pamela"

The tender shown, whilst having the characteristic old Southern outline, has the same overall length, wheelbase, and wheel diameter as the original spam-can tenders ; this is intentional, as we kept to the original chassis length, wheelbase, and wheels, on the engine part. Therefore, if the full-sized engines were rebuilt in similar manner (which isn't at all improbable—things like that have happened before, and history repeats itself) they could use the existing turntables, and be available over the same routes. As we gave the engine a British Railways number, I have put their crest on the tender, instead of labelling it "Southern." Did I hear somebody start singing "I Taut I Taw a Puddy-tat" ?

Frame Construction

After completing the engine part, even builders with comparatively little experience should be able to cut out frames, turn wheels and axles, and make and fit component parts without any need of my going over the whole detailed rigmarole again ; so the description of the tender shouldn't take very long. New readers requiring detailed instructions, can find plenty in the description of how to build *Tich*, which is being fully detailed, especially for the benefit of beginners starting absolutely from zero, without either knowledge or experience. For the frame plates of *Pamela's* tender, two pieces of soft mild-steel sheet, blue or bright, 13-gauge or 3/32 in. thick, measuring 16 in. length and 2¾ in. width, will be needed. This allows for finishing to given dimensions. Mark off one plate as shown, drill all holes, file off any burring, then clamp the plates together, drill a couple of holes in the second one, through two of the end holes in the first plate, and temporarily rivet together. Drill all the holes in the second plate, using the first as a jig, then saw and file to the outlines given. Note : if you are intending to use angles, as shown at one end, for attaching the buffer and drag beams, drill all the holes shown. If the



Details of tender frames

frames are to be brazed into the slots in the beams, leave out the four holes at each end of the frame, near the top.

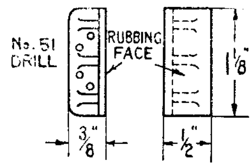
The drawing shows ribbed horncheeks, which are castings, and should only need rubbing on a file, to smooth the back and side. If castings don't happen to be available in your locality, use a piece of angle, $\frac{3}{8}$ in. × $\frac{1}{2}$ in. × 3/32 in., cut to the same length as horncheeks, and the side next to frame rounded off in same manner. Drill all holes, in either kind, and rivet to frames, with the upper ends level with the tops of the axlebox openings. Don't forget that the easiest way to locate them correctly, for width apart, is to put a $\frac{5}{8}$ in. wide bar in the frame opening, and set the horncheeks to it, holding with a toolmaker's cramp whilst you drill the rivet holes in the frame. Use iron or brass rivets if obtainable, as they hold tighter than copper rivets.

Although cast dummy springs, with buffer plungers in the hoop, are shown in the drawings which will follow, working leaf springs may be fitted if desired; and for both types, the lugs for spring-pins or hangers, are the same. They are made from $\frac{3}{8}$ in. × $\frac{3}{16}$ in. steel rod; chuck truly in four-jaw, and turn a $\frac{1}{8}$-in. pip $\frac{3}{16}$ in. long for riveting, or $\frac{1}{4}$ in. long for screwing. Alternatives are shown in the plan view. Drill a No. 48 hole at $\frac{1}{4}$ in. from the shoulder, tap 3/32 in. or 7 B.A., saw or part off at $\frac{7}{16}$ in. from the shoulder, and round off with a file. To fix by riveting, simply push the stems through the holes

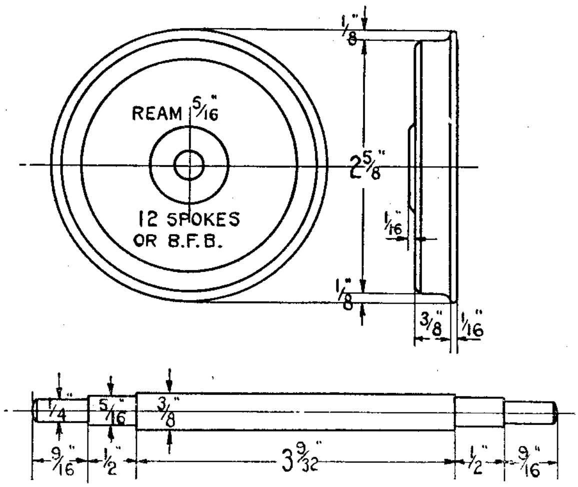
located $1\frac{7}{16}$ in. each side of the centre of axlebox opening, and burr over to form a cup head on the inside frame, as shown. The stems may be screwed and nutted if preferred.

A 4-in. length of $\frac{1}{4}$-in. × $\frac{1}{16}$-in. angle, is riveted to the top inside edge of each frame plate, in the centre, using $\frac{1}{16}$-in. brass or iron rivets.

outside. Pieces of fairly large diameter gas or steam barrel make nobby distance-pieces, as they can be squared off in the lathe, so that both ends are parallel, and the piece is dead to length. Note, the distance-piece need not be a solid block or tube ; pieces of metal can be placed side by side, to make up the desired width, and the cramp out-



Horncheeks



Left—wheel and axle details

How to Erect Frames

Make the buffer and drag beams from 1-in. × $\frac{1}{8}$-in. angle. The front beam is very simple, merely having the corners cut off as shown, and the drawbar slot drilled and filed. The back one is the same as the engine front beam, except that the holes for the buffer shanks are tapped instead of being plain ; the reason for this you will see in due course. The tops of both beams are slotted, in the same way as described for the engine beams ; but the slots are only 3/32 in. wide, and $4\frac{1}{2}$ in. apart. Cut away the corners as shown.

For angle fixing, rivet a $\frac{7}{8}$ in. length of $\frac{3}{8}$-in. × $\frac{1}{8}$-in. angle against the inner side of each slot, as described for the engine, jamming a piece of 3/32-in. sheet metal in the slot, and butting up the angle against it, before attaching the cramp, preparatory to drilling the rivet holes. Use $\frac{1}{8}$-in. iron rivets.

Jam the frames right home into the slots in the beams ; adjust for squareness as near as you can by eye, then lay the assembly upside down on the lathe bed, or something equally flat and true, and adjust them until there is no rock in any direction. Set the beams dead square to frames, with a try-square. If angle attachment is used, put a toolmaker's cramp on each angle before drilling and tapping the screwholes, using the holes in the frame as guide. When all the screws are well home, the assembly should still lie on the lathe bed without the vestige of a rock.

If brazing is adopted, proceed as described for the engine frames of *Britannia*. True up on the lathe bed as above, then put a couple of distance-pieces between the frames, with clamps over the side the frames holds the lot secure, as it did on my little *Britannia*. Apply wet flux where the frame enters the slot, and where it touches the vertical part of the beam. If using a blowlamp, the whole beam and adjacent bits of frame, must be heated to the melting point of the brazing material, which may be easy-running strip, or soft brass wire. Run in enough to make a fillet, but don't overdo it. After the second beam has cooled to black, quench in water, knock off all burnt flux, and file off any superfluous blobs of brazing material that may have oozed through on to the top of the beam, or any other place where they have no business to be.

The above ought to keep *Pamela* builders busy until I can draw the axleboxes, springs, etc., and get out the section of the tender body. Meantime, in the event of anybody being stuck for a job, drawings of the wheels and axles are appended. These can be turned up to the dimensions given, and the wheels pressed straight on to the axles, all ready for erection, as the axleboxes are outside the wheels.

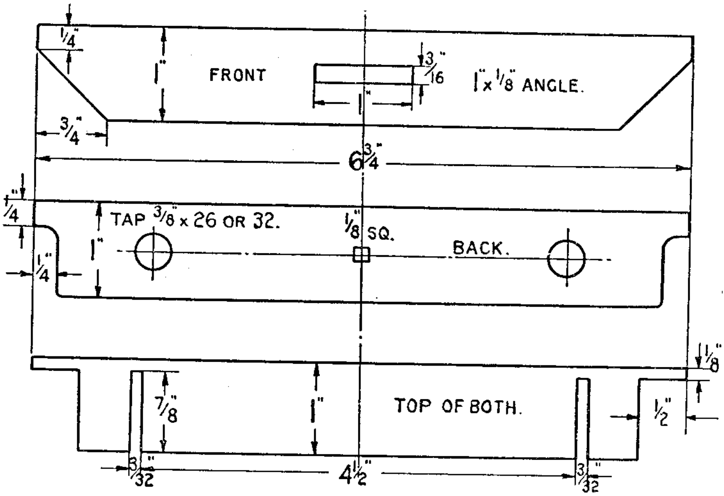
Whodunit ?

I was amazed to read Bro. Hyphen's implication that " some person or persons unknown " as the jury's verdict would put it, had put nitric acid in the tender of his engine. Nobody would be so mean ! Had they wished to play a practical joke on him, a small knob of soft soap would have put the engine *hors-de-combat* for a short time, without doing a farthingsworth of damage ; it has been done in full-size practice, to take a rise out of a driver who was, in shed parlance, " a bit too cocky." However, I think I can

explain what happened, from my own experiences. Chemicals of a kind *were* put into his tender, but the culprit was none other than Bro. Hyphen himself!

The mains water in our district is as pure as any to be found in this country. Our domestic kettles show no traces of "fur" after years of constant use, and there is nothing in the hot-water tank or pipes. Occasionally, I wash out one or other of my locomotive boilers, but it is merely a matter of routine, as nothing in the way of scale ever comes out. However, there is a wasp in the jampot. Ever since the typhoid scare in Croydon some years ago, the water is chlorinated; normally, it is hardly noticeable, but on occasions the water both smells and tastes of chemicals. The result of using the water in the locomotive boilers, is that brass fittings corrode, go brittle, and break; copper pipes, and injector cones, become choked with a pale green deposit if not kept clean. Our natural water suppliers, Jupiter Pluvius & Co. (at the time of writing, apparently unlimited!) usually keep my water-tank by the side of the railway, at a fair level; but if this supply fails, and I have to fill the tank from the main supply, I have to keep a sharp look-out, to see that nothing untoward happens to the engines.

"Curlylock Holmes" deduces that something of the kind happened in Bro. Hyphen's case. The corrosion had apparently been going on for some considerable time, and it *would* happen, by the natural cussedness of things in this benighted topsy-turvy world, that the climax took place at the most inconvenient time. Even if some nefarious and unscrupulous person, with malice aforethought, as the six-and-eightpenny (if it hasn't gone up, like everything else) fraternity would say, had put corrosive acid in the tender, it would have taken more than one shot, and considerably more time, to have done the damage he describes. Personally, I'd never put so-called rustless steel inside a boiler. The rustless properties of certain kinds of steel vary with the temperature; I know of a boiler which originally had rustless steel staybolts. The builder was absolutely cocksure that they would be superior to copper; but the original heating when sweating the nuts, and the sustained working temperature of the boiler, affected them to such an extent that they wasted away, starting from the centre, and finally several of them gave out. They were all replaced with copper stays, since when, there has been no trouble.



Buffer and drag beams

Bro. Hyphen says his special chilled cast bronze piston-valve liners showed wear in the middle, where the bobbins worked. My old $2\frac{1}{2}$-in. gauge 4-6-2 *Fernanda* has been running for sixteen years or so; and the liners, which have never been out, are as good now, as ever they were. One Wednesday in the middle of last January, our advertisement manager, Mr. T. C. Page, called here to have a run on my road. Yes, we have a very practical "executive"! *Fernanda* did the doings on this particular occasion, and astonished our worthy friend by her liveliness. Toward the finish of the run, I put on another car, and she took the two of us, a load equal to over 1,000 tons, around the line at high speed, despite the damp and slippery rails. The beats as she got under way, were a treat to hear; sharp, even, distinct, and with no trace of a wheeze. At high speed, they are still distinguishable as a sort of faint rattle, when the load is heavy. There is nothing amiss with her piston-valves or liners. The latter are made from ordinary drawn bronze rod, nothing special about it, drilled and reamed in the ordinary way. Now I'll tell you something. She originally had two ground rustless steel piston-valves. One is still in, and shows no sign of wear. The other was taken out, some years ago; and as an experiment, a drawn bronze one, of different-grade metal to the liner, replaced it. As the drawn metal was a good sliding fit in the liner, *the bobbins were not turned*, but left with the drawn surface. It has never blown, neither has it worn. The secret is, *that the metals never come in contact*, being separated by a film of cylinder oil supplied by an efficient lubricator. Nuff sed!

HEXAGON HEADS

by B. Bagnall

THE accessories here described will, I feel, commend themselves to those who prefer bolts or set-pins with hexagon heads which are somewhere near to scale, without being so small in the thread as to preclude their use on account of general weakness.

There have been many excellent articles in THE MODEL ENGINEER in the past, describing methods of producing bolts, but the writer has not succeeded in tearing himself away from the job in hand to explore this sphere. Not wishing to spend my meagre leisure in producing the threads, I started by evolving a method of reducing the heads of standard commercial articles.

No doubt as time goes on I may delve more deeply into the more complete production of the whole article.

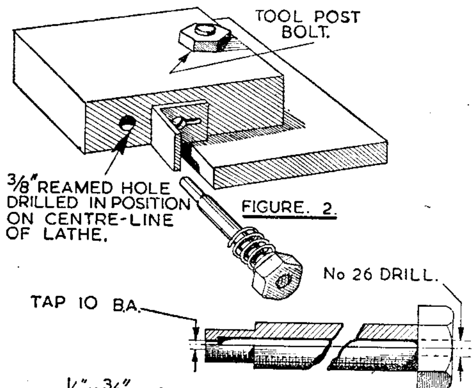


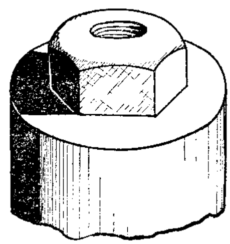
FIGURE. 2.

The first attempt at forming hexagon heads was exceedingly slow. This consisted of making a filing jig (Fig. 1) into which the bolt was screwed, and filed away until the hardened faces of the jig left a mediocre hexagon. It proved difficult, however, to file a true hexagon as small as 0.082 in. across the flats and quite tricky to harden, as there was so little metal left between the threaded hole and the flat.

However, it did serve to show the possibility of producing a satisfactory box spanner, by using the filing jig as a drift, I was able to drift out a hexagon hole in the end of a piece of silver-steel.

Originally this box spanner was used to remove the bolt from the filing jig after it had been filed to size.

Thus, having tasted success with 10-B.A. headed bolts a bare 20 thou. across the flats larger than the thread, all I needed was some way of producing these with a little more speed and a little more accuracy.



7/32" SILVER STEEL
FIGURE. 1.

Figs. 2 and 3 will give some idea of how this was done. Two small slitting saws, $1\frac{1}{8}$ in. diameter, $\frac{5}{8}$ in. bore, 0.018 in. thick, were purchased from an advertiser in THE MODEL ENGINEER and mounted on an arbor, separated by a light alloy collar the thickness of which was equal to the *A-F* dimension required. Whilst making this collar, others were also parted off, a nominal 0.020 in. larger than standard B.A. thread sizes. As each of these are subsequently used they will be marked in B.A. sizes and will become my new standard size for home-produced bolts.

The arbor is made from the No. 2 Morse taper of an old drill welded to a stub of 1-in. B.M.S. about 2 in. long.

This was afterwards fitted to the tapered headstock mandrel and the 1 in. stub centred, faced and reduced to $\frac{7}{8}$ in. diameter. It was then further reduced to $\frac{5}{8}$ in. leaving a $\frac{7}{8}$ in. collar, $\frac{1}{8}$ in. thick, and screw-cut $\frac{5}{8}$ in. $\times$ 16 t.p.i., leaving a plain part about $\frac{1}{2}$ in. long, which was a good fit in the bore of the slitting saw. The saws were then placed in position with the required distance-piece between and the spare distance-pieces used as washers between the last saw and a $\frac{5}{8}$ in. $\times$ 16 t.p.i. nut.

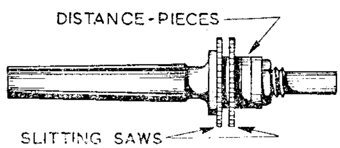


FIGURE. 3.

All that was now needed was some way of preventing the oversize heads to these saws, and some simple device for driving.

A collet was first tried fixed in the tool holder and fed in by the cross-slide, but this proved slow and cumbersome, and it was difficult to remove the small finished head from the collet in the space available.

Fig. 2 shows the method finally adopted which has proved to be ideal in every way. It consists of a block—mild-steel or any handy material may be used—even a synthetic resin—provided it will take a $\frac{3}{8}$-in. reamer and leave a clean hole. As my own lathe is fitted with a four-way toolpost

I did not wish to disturb my set tools, consequently the block was made to take the place of the toolpost and held down by the toolpost bolt.

Drilling the hole on the lathe centre-line was simplicity itself and this was reamed a good fit for a $\frac{3}{8}$-in. bright steel bolt. This bolt, as shown, was first drilled up from the head end a good clearance size to leave about $\frac{3}{16}$ in. of solid at the other end, which was then carefully centred and drilled, and tapped 10 B.A., and then the $\frac{3}{8}$-in. thread was turned off the outside. A suitable light spring is interposed between the bolt head and the block so that when the bolt is pushed home it will just reach the saws, and when released will enable the bolt to be easily withdrawn.

Fitted to the block also is a small angle held by a screw and capable of being adjusted by the hole in the angle being slotted.

This is positioned so that each face of the hexagon head of the $\frac{3}{8}$-in. bolt slides snugly without any tendency to rotate; the faces of the head being carefully filed until this was achieved.

After first setting the slide to present the head of the bolt being operated upon exactly in the centre of the saws, it is only necessary to feed the bolt in, withdraw and turn 60 deg., and feed again. Three feeds and the job is done, after which the bolt is withdrawn completely and the new nice clean small-headed hexagon 10-B.A. bolt is unscrewed and the next one screwed in.

This method may also be used to alter hexagon nuts and make hexagon drifts to form new spanners. The $\frac{3}{8}$-in. bolt is afterwards set up carefully in the four-jaw and used as a stub mandrel to fetch the bolt head down to scale thickness. Before alteration the commercial heads were 0.117 in. A-F., but after treatment looked considerably better on the running-board of a $\frac{3}{4}$-in. scale Class 5 locomotive, where they secure the sandbox brackets just ahead of the trailing coupled wheel.

A Pilgrimage to Warwickshire in Search of "The Twins"

MOST people at holiday time seek the advice of a guide book of some description, to help with the choice of locality. But I, and maybe others, turn to our own library, THE MODEL ENGINEER, for such information. You might ask, "How could you expect THE MODEL ENGINEER to be of any use?" But if I add that I am a steam fan, you have your answer.

Under my wife's eye I glanced casually (?) through a pile of books, until, came Vol. 102, No. 2550, and Henry A. J. Lawrence's article on "Old Ploughing Engines." My wife's "Yes, dear," when I suggested Warwickshire for a holiday tour, was surprisingly acquiescent, there was still no demur when I caught her reading No. 2550.

But . . . I have always known my wife was, and is, the world's worst map reader. I did *not* know that her attempts at guiding us from Southampton to Warwick would lead where they did. Not, that is, until I found myself at Gretna Green! From there, under the combined pressure from the wife and two daughters, I was set on a tour of the Lake District. I was driven halfway up Helvellyn, hoisted to the top of Blackpool tower, burned ~~to~~ a cinder at Rhyl, and finally requested to descend from the summit of Snowdon "under my own steam!"

Then, in what I fondly hoped was a couldn't-care-less tone, I wondered aloud if we couldn't head for Warwickshire? In all these miles, I had seen only one engine. This was a road locomotive engaged on stone-crushing. (For any Lakeland reader, this is on the Coniston-Hawkshead road.)

Thankfully, I headed the car for Stratford-on-Avon, and on reaching there, turned left over the bridge toward Wellesbourne—a few miles more and to the left again for Charlecote. There was magic in the very name. Would "they" still be there, as my guide book said. Slowly now, we crawled through the village, with never a chimney to guide us. Yes, here was the wall mentioned by my fellow enthusiast, but still no chimneys. Fearfully I wondered, what had happened to the "twins"; had they fallen victim to the gas-pipe?

I stopped the car, got out, and walked toward a group of fellows on the strip of green near the wall. Hoping for the best, but resigned to hearing the worst, I asked the young man, who greeted me, if he could tell me what had become of the old ploughing engines. He fingered his dangling braces a moment, then, as comprehension dawned, he said "Why, old Jack Hyde, over there, 'ud know, he used to drive 'em." Of all the luck, to have chanced on one of the drivers! "Why, yes," said Jack, "they're still here, we had 'em out last year, scuffing." Oh, sweet unforgettable words—they're still here! The term "scuffing" was a new one to me—the word we use in the south is "scarifiers." Well, we talked engines and steam; the other driver, he told me, was now 74 and had driven ploughing engines when the driver sat in front and steered.

Jack Hyde is hoping that with the aid of his two mates the engines will be out again scuffing, after the harvest. I took leave of my new friend—now to find "them."

He had told me where they were, "Up to Edgar's farm, a mile away. Through the farm and into the meadow You'll see 'em!"

Yes, there they were, in all their splendour. The right-hand engine in front, the left-hand engine next, drawing the scuffer and water-cart. I walked around them in silent reverence—they were indeed worthy of the tribulations I had suffered for them! I gazed up at their proud, lofty chimneys, then carefully I climbed on to the driving plate.

The shovel lay half in the bunker, the slicer in its brackets, but the licence holder is dated 1949. I can almost visualise Jack Hyde and the grand old mate of his on what may prove to be their last ride.—R. PALMER.

TOOLS FOR THE LATHE

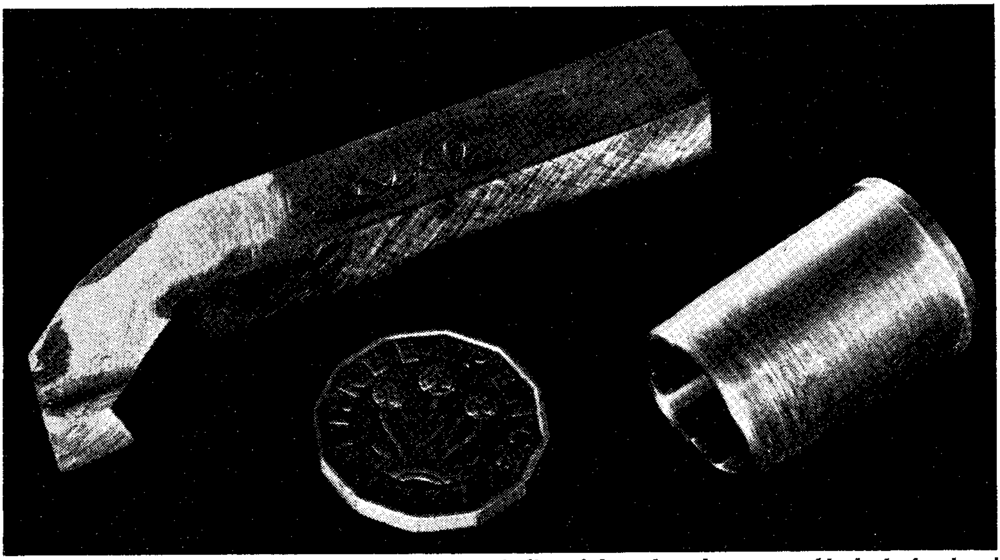
by "Scotia"

THERE are those among us in the model engineering fraternity who are able to indulge to the full, their whims and fancies, and in consequence are the proud possessors of shining lathes, milling and drilling machines.

However, as we all know, the chap with the modest, indeed scanty equipment, can very often produce commendable work which is a credit to the limited means at his disposal, and it is with such a fellow that we are concerned.

often possible to alter one of the tools mentioned for the purpose required. This tool, being of standard type, can usually be replaced easily enough. In studying the question of tool qualities, it may be remarked that tools of an inferior brand are sometimes offered for sale, which have little to commend them, except perhaps in the matter of price.

Good quality high-speed steel tools are well worth buying; their saving in time and temper,



Work-hardening on stainless-steel due to incorrect grinding of the tool, and aggravated by lack of coolant!

Most of us are human enough to fall into the common errors which beset us, in the course of our model-making activities. With the exception, perhaps, of the matter of lathe work, the writer is no different from anyone else in this respect, and it is on this subject that these comments are given with a view to helping, wherever possible, in this all-important part of the work. First, then, let us consider the tools required.

There should be a small range of tools, enough perhaps, to cover general requirements. These should include a right- and left-hand cranked tool, ground suitably for sliding and surfacing, a knife tool—perhaps a couple of boring and recessing tools, and lastly a parting-off tool. These may be regarded as the essentials and it is surprising, to the newcomer, just how many forms of turning requirements are covered by their use.

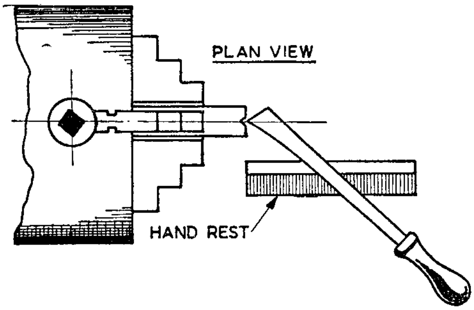
It may be felt, on occasion, that some special tool, perhaps of an odd shape, is necessary to the work in hand. Much thought should be given to this before committing oneself, as it is

and their capacity to produce good work amply offsetting their higher price.

Much has been written about the abiding qualities of tungsten carbide tipped tools. Granted, they are a great advantage, and in the large workshop, which was their birthplace, they are now so firmly established as to be regarded as indispensible. In observations made over a considerable period of time, the writer has formed the opinion, that top performance from these tools is only obtained when absolute rigidity is present. In heavy-duty automatic lathes, in the work-shop, for instance, these tools can keep relatively sharp for days on end, while continually subjected to severe cutting strain. No such conditions of rigidity exist in the average home-built model maker's lathe, and consequently the worker is often dismayed and confused at the poor performance of the "wonder" tool.

On one occasion recently, I witnessed, on a home-built lathe, an exhibition put on for my benefit of a tipped tool starting a cut on a cast-

iron casting. If it had not been for the concern of the owner of the lathe, it would have been funny! At every revolution of the lathe spindle, the tool reeled back like a drunken man, and made little impression on the work. Truly a case where drastic over-hauling was necessary. Conditions like these, of course in a lesser degree,



Centring for drilling with the hand-tool. With the fingers of the left hand round the T-rest, the thumb holds and directs the tool to the work, support being given by the right hand on the wooden handle!

occur in a lathe of sounder construction, and in general, affect the durability of the tool. It may be logical to assume then, that results from this type of tool should be viewed with regard to the conditions imposed on them while working. If the skin of the casting is successfully removed by their use, it is often advisable to revert to the use of a high-speed steel tool to complete the work.

Care should be taken against the indiscriminate use of tipped tools which have long past lost their sharpness, as work-hardening can easily result, especially on the skin of a casting or forging. Work-hardening can, of course, occur also as a result of using inferior steel tools, and is often aggravated by lack of a proper coolant, or one of insufficient supply. The obvious remedy is to keep the tools sharp, and to use those of reasonably good quality.

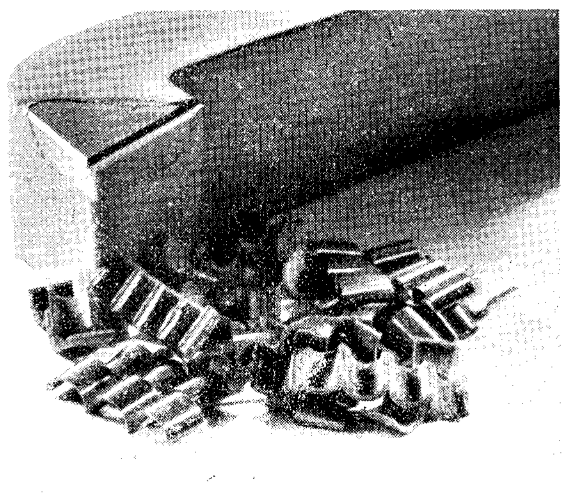
I have described the use of hand-turning tools on more than one occasion in these pages, and it is not my intention to launch into a long discourse on their use here. Although able to tackle almost anything in regard to the softer metals, if used correctly, I am well aware that their use is not everybody's "cup of tea." They have their limitations, and it would be folly indeed to use them on intermittent cutting. May it be remarked, while on the subject of intermittent cutting, that it is usual for the worker, if he is aware of backlash in the saddle, to keep a light pull by hand on the toolpost during the progress of the cut, in order to prevent lash occurring with the resultant wrecking of the job by the tool charging the work.

One last point concerning hand-turning tools—perhaps it may not be generally known that centring for drilling can be done with a high degree of accuracy on brass, plastics, etc., by the correct use of the flat hand-tool. This is just one more instance of the versatility of hand-turning tools, and it is to be deplored that their use is indeed a dying art.

With regard to the measuring equipment for use on the lathe, a pair of inside and outside calipers, of a suitable size, are necessary, those of the tension screw adjustment type being the most suitable. A pair of "jenny" calipers are also very useful.

At the risk of going over old ground, may I say that the micro-meter is an instrument one is loth to dispense with, once having made its acquaintance. It is not difficult to master, and many interesting and exacting pieces of work can be accomplished with the aid of this remarkable measuring unit. Sliding fits, running fits, push and driving fits can all be done, not to mention shoulder thicknesses and special size bores, with an exactitude not comparable with any other method. Special limit sizes on the bore are done by setting the inside calipers to a "scraping" fit between the anvils, the object being, when tooling out, to obtain the same feel of the calipers on the work. Without a doubt a micrometer is a sound investment.

To sum up on the tools and equipment commented upon, they may be regarded, (with the possible exception of the "mic," and the hand-turning tools mentioned) as being the essentials.



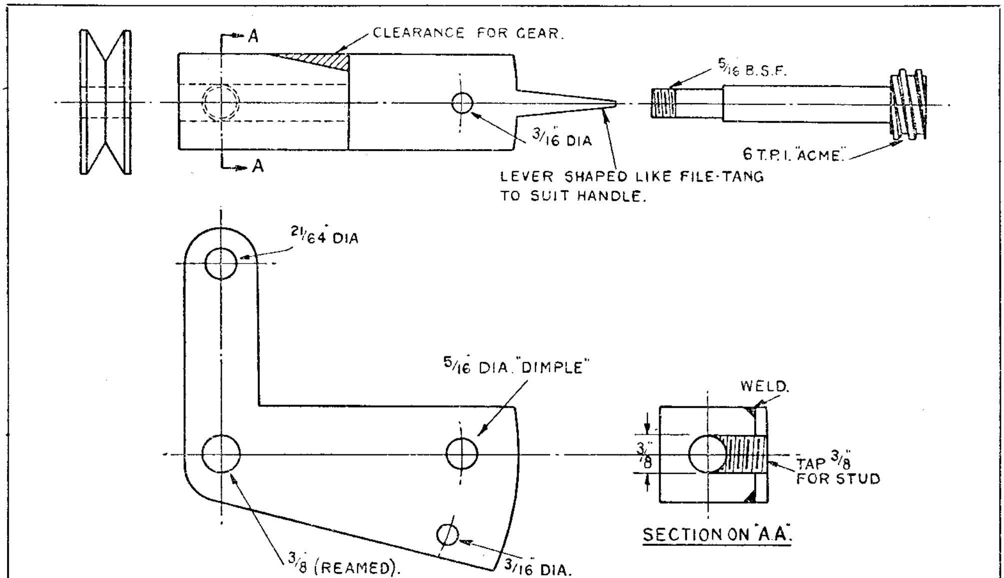
Heavy section tool of a special type used on Herbert automatic lathes; the step ground on the face forms a chip-breaker for machining steel, the turnings being broken up at once with less danger to the operator and better accommodation in the chip-tray!

I have refrained from commenting upon top rakes and clearances on tools, as this subject has been fully covered time and again. However, it is well to remember the importance of this, in relation to the type of metals to be turned.

Self-Acting from the Leadscrew

by F. T. Leightwood

MOST lathes used by model engineers are of a "utility" design, in that there are just the bare essentials. Due to this the leadscrew is pressed into service for self-acting, using the largest change-wheels meshed with the smallest in order to reduce the coarse-pitch of the screw to a suitable feed-rate for the saddle.



Details of parts for the self-act gear

Although this serves its purpose, there are various snags and four of these are as follows :

(1) Only coarse feeds are available (my smallest wheel is 20 and the largest 65), which means that I can only self-act in back-gear.

(2) The "weight" of the gearing makes hand-feeding very difficult, as the rack-gear is useless for all except quick-traversing, i.e., bringing the tool up into position and withdrawing again.

(3) Changing over from self-acting to screw-cutting needs a longer time than many small repetition jobs.

(4) When using a slow speed, i.e. turning large diameters, the time taken for the leadscrew to come into a position for engaging the lead-nut can be quite trying, especially for the "pedal brigade."

Although I have seen various means of overcoming some of these snags, none seemed to be ideal and so I decided to try something different. It seemed to me that a single start worm would be a good way to reduce the speed of rotation of the leadscrew without too many gears, in fact for a feed of 0.002 (approx.) I could use my biggest wheel by itself. This settled No. (1) snag, but made No. (2) impossible. In order to overcome this, however, the worm could be mounted on a quadrant and put out of mesh by a lever, thus settling with No. (2) snag. By making the worm, its bearing, the lever and quadrant into a self-contained unit fastened to the swing-frame by one bolt, changing over to screwcutting would be simpler, as the pulley on the stud could be used to drive the stud-gear in place of the collars used on my lathe. This eased the situation in snag No. (3) and snag No. (4) goes with snag No. (2), as the lead-nut can be engaged, the tool brought up to the start of the cut, and the worm engaged, thus allowing the cut to commence almost as soon as the mandrel begins to turn.

Having settled these points in my mind, I took the necessary dimensions off the lathe and drew up the arrangement drawing for the attachment. The pitch of the worm was settled by trying a screw-pitch gauge with a wheel. This was found to be 6 t.p.i. and so construction was commenced with this part. As I did not want to put too much wear on the change-wheels, I decided to use mild-steel for the worm instead of the usual hardened steel. A $\frac{1}{2}$-in. bolt was pressed into service for this, the head, when turned

being a suitable diameter for the worm. This is a compromise between friction and a steep pitch angle. By that, I mean, I could use a large diameter worm on which, for this pitch, the angle would be close to 90 deg. (which is the same as the teeth of the change-wheel). The high *surface* speed of such a worm would mean high frictional loss, to say nothing of high wear. On the other hand a small worm would be slower in wear on the change-wheel and the frictional loss much smaller (no small point when the foot provides the power). However, the inefficiency of *too* small a diameter worm would have the same effect, owing to the steepness of the pitch-angle causing it to bind in the teeth of the wheel.

A tool was ground the same width as the root of the teeth of the change-wheels and the sides at 28 deg.

The shank of the bolt is reduced to $\frac{3}{8}$ in. diameter for the bearing, and $\frac{5}{16}$ in. for the pulley, the end being screwed $\frac{5}{16}$ in. B.S.F. for a locknut.

The bearing is a short length of 1-in. round bar. This can be any section, of course, square bar would be better for anyone who cannot obtain the use of a welding plant, and must use c/s screws. The bore is $\frac{5}{8}$ in. for the phosphor-bronze bushes, which are bored to suit the worm spindle. In order to keep the bearing surfaces properly lubricated, an $\frac{1}{8}$-in. hole is drilled and countersunk in the top, any oil working its way past the worm-end bush simply gets on to the worm and is distributed round the change-wheel.

The lever and backplate are marked out and cut from $\frac{1}{8}$-in. (10 s.w.g.) plate. This is quite strong enough for the job, in fact thicker plate would cause trouble in engaging and disengaging owing its greater stiffness. However, should it be preferred the backplate could be made heavier. The lever and the bearing were welded together, taking care, of course, to keep the lubrication hole to the top. The next operation was to drill the hole for the stud, the lever being mounted on the boring table, squared vertically and horizontally and drilled $\frac{5}{16}$ in. This was followed with the $\frac{3}{8}$-in. tap, using the wrench as a carrier, and the running centre engaging the centre in the end of the tap.

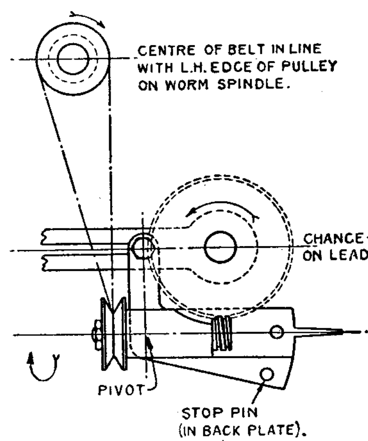
By this means the stud is square to the contact face of the lever which, though not strictly necessary, is much better than the more risky hand tapping. The hole for the stud is also kept a decent fit on the stud for the same reason, though any size of hole would do, provided that the nuts won't come through, of course!

The lock-nuts are spaced from the backplate by a double spring washer. This was fitted for the double purpose of taking up the plain section of the stud and to give a spring to the parts, although the natural spring of the steel makes it not strictly necessary, and plain washers would be quite suitable.

The parts are assembled for the next operation, that is, drilling the "dimple" for the rivet. To ensure correct alignment a $\frac{3}{16}$-in. hole is drilled, not quite through the backplate, using the hole in the lever for a guide; the hole for the stop can also be drilled the same way. The "dimple" is then opened out with a $\frac{5}{16}$-in. drill, and if a steel ball is available, the "dimple" can be made a better shape by hammering it in the dimple. A short $\frac{3}{16}$-in. iron rivet is fitted, head inwards, in the lever and if all is well it should snap in and out of the dimple without requiring undue force, yet holding in position quite firmly. This can be adjusted either by adjusting the locknuts on the stud or bending the lever (or to be technical—setting the lever) in the vice.

The pulleys are turned from $1\frac{1}{2}$-in. bar and grooved deeply in order to discourage the belt from leaving their appointed tracks. To assist this also, the pulley must be set so that the belt *leads* on to each pulley at as near right angles as possible.

Grub-screws serve to lock both pulleys, being fitted deep in the grooves, though the "worm" or "driven" pulley is also held by the $\frac{5}{16}$-in.



Arrangement of self-act gear

lock-nut. In order to minimise the change-over from screw-cutting to self-acting, the "driving" or "stud" pulley is drilled axially for a $\frac{1}{8}$ in dowel to drive a change-wheel—usually the 20T. wheel. In operation, the only trouble I have is, if I allow the mandrel to run back, the belt nips off the bottom pulley smartly—a fault which I expect power driven lathes don't have to cope with.

So far, I have only used one feed, 0.002 in. This is quite heavy enough for me to treadle and anyway, I prefer increasing the depth of the cut when I can manage a heavy feed e.g. when machining dural, etc.

In passing, I would like to comment on how much one can learn *re*: lubrication, tool-cutting efficiency, and the comparative hardness of materials with a treadle lathe. When starting operations, a drop of very thin oil makes all the difference in the world and dull tools just won't do at all. Incorrect angles make themselves felt, too, and to ensure proper grinding of the tools, I have a tilting table 3 in. square on my grinder-cum-wood-lathe, using the side of the stone for clearance angles and the edge for top rake.

PRACTICAL LETTERS

Rust Prevention

DEAR SIR,—When model engineers and others get tired of general topics, they revert to the old grey mare—"*Rust*." She has a grand life and in some part of every year, she is warmed with ½ kW electric fires, or blue-flame stoves and sometimes dipped in various liquids.

I often wonder what model engineers would do in this climate where, at times, the relative humidity goes up to 95 per cent.

I have tools in use today as clean and bright as they were when I bought them 25 years ago.

My remedy is—keep workshop windows open all the year round and use an oil rag—that's all!

Tauranga, New Zealand.

Yours faithfully,
JOHN H. DANIELS.

Test Reports on Machine Tools

DEAR SIR,—The letter from Mr. G. E. Fritche in a recent issue of THE MODEL ENGINEER should be of interest to us all—buyers of machine tools and makers thereof.

Unbiased, careful reports should be of great value to the trade, a factual statement in THE MODEL ENGINEER would be a magnificent advertisement for any machine submitted. Let it be part of the great work THE MODEL ENGINEER is doing for the world-wide fraternity—let it give confidence to the buyer in Tasmania, Fiji and Putney.

There is evidence that shoddy tools are being offered for sale.

Yours faithfully,
Newbury. G. W. ALLINSON.

Model Cars and Model Engineering

DEAR SIR,—As a model car enthusiast, may I be allowed to make a few comments on the article by "Critic" which was printed in THE MODEL ENGINEER dated 18th January, 1951.

First of all, why does a model car racer have to be a model engineer? "Critic" states that the early pioneers were from the power boat fraternity and from other "approved" branches of model engineering. By this last remark does he mean the model railway and traction engine makers? Also, who "approves" the branches of model engineering and does one have to build a model railway locomotive or traction engine before one can be allowed to think of building a model race car? I have seen at least two examples of "model racing car chassis" built by "model engineers" and to a person with only a slight knowledge of model car design it could be seen that they were hopelessly impracticable and they looked horrible. One proud constructor was not even too sure how the 5 c.c. motor which was to power his effort, worked.

Surely there is room in the sport for model engineers, and the not so skilled persons who have no workshop, but who find in model car racing an interest which gives them great pleasure? Model engineers are supposed to be a friendly body, well, if this is so, perhaps they would show a little more to "outsiders," and the dog-in-the-manger attitude adopted by "Critic" (who presumably is a model engineer), would disappear.

Your contributor also bleats about this urge for more speed, and the consequent discarding of clutches, springs, instrument panels, etc., and consequent lack of realism. Well, surely this is up to the individual. As long as the rules of contests are framed to encourage speed, then builders (and buyers) will strive to gain more speed. I admit that the American "proto." and "spur" cars bear little or no resemblance to their full sized brethren, but then do John Cobbs's Railton Mobil Special, Goldie Gardner's M.G. or George Eyston's "Thunderbolt" look like cars? So if a model car racer is content with no springing, direct drive, knife edged wheels and the like—then let him get on with it, and in the meantime why not press the M.C.A. and the clubs to run more events to encourage scale "outline" cars. There are no true to scale model cars as yet.

Incidentally, how many model aircraft or the model hydroplanes—which, strangely enough, are accepted without comment by model engineers (until someone puts a Dooling into one) look like the real thing? No, they are designed to do a job, and to do it as efficiently as possible.

Now, another point, the Dooling "61" not "60" as quoted by "Critic." What does he mean when he says the "snob value" is little short of fantastic? There are a goodly proportion of "61's" and the newer "29's" in my club, but their owners are certainly no snobs. As a matter of fact, at a meeting recently, one of the "snobs" offered me an "Arrow" to run, as I was without a car (he wasn't a model engineer). The reason that the "61" is so widely acclaimed is that it is just about the best there is. Nobody accuses a 500 c.c. driver of being a snob if he obtains a Cooper—just because it is the best buy for the job in hand. So, come off it "Critic" and give credit where it is due for a fine piece of work by the brothers Dooling. The "Arrow" also comes in for its share of criticism. Is it model engineering, says "Critic." Well, all I can say is that a motor which will rev. at 18-20 thousand, develop over one horsepower and a car that will stand up to being pushed around at over 130 m.p.h., together they must be a pretty fine piece of engineering of one form or another.

I myself have been running cars since the "Galeota" days, and have built four free-lance designs, none of which has been a contest winner, but I'll wager I get just as much pleasure out of watching my old E.D. 2 c.c. job ambling around the track at 35 m.p.h. as any model engineer does when his precision built replica takes the concrete.

What we want is less destructive criticism in our hobby and more people who engage in it for the joy of running a car, and not for pot-hunting or moaning because American engines or cars are faster than theirs. Also, we want more people who are in win or lose, not pack up when

their fame is eclipsed by others. Such people are best forgotten.

As for model car racing being a fetish, I've never heard of anything so ridiculous. Admittedly some people take it more seriously than others do, but then isn't this also true of other things ? If " Critic " wants to meet a bunch of real model car racers, he should visit one of the Edmonton M.C.C. meetings, where he will find none of the alleged snobbery by Dooling owners, but a gang of fellows who just enjoy racing model cars.

Yours sincerely,

South Woodford. L. A. MANWARING.
Edmonton M.C.C.

CLUB ANNOUNCEMENTS

The Society of Model and Experimental Engineers

The next meeting of the society will be held at 7 p.m. on Thursday, March 22nd, 1951, at the Caxton Hall. To enable members, particularly new members, to meet and discuss their own particular interests with other members, the council have decided to make the meeting as informal as possible. It is, therefore, intended that after the formal business has been disposed of, that members shall be free to join any of several discussion groups which will be formed to discuss, informally, small locomotives, tools, steam and petrol engines, boilers, and kindred topics.

It is the council's wish that members will bring some small sample of their work to the meeting, since this will stimulate discussion and enable members with similar interests to meet on common ground. Visitors will be cordially welcomed.

Visitors and prospective members may obtain tickets of admission to this meeting and application forms to join the society from the Hon. Secretary, A. B. STORRAR, 67, Station Road, West Wickham, Kent.

The Orpington Model Engineering Society

At this society's last meeting, the question of a summer outing was discussed, and it was finally decided to visit Hastings, on Sunday, June 10th. A member of the Hastings society was present, and he promised to make enquiries as to whether a track and a pond could be placed at Orpington's disposal for the day. In any case. Hastings is a pleasant spot to visit, and all members are urged to book the date and turn up, complete with wives and families !

The next meeting will be on Sunday, April 1st, and as this will be the last meeting before the arts and crafts exhibition, all members should try to be present so that final plans can be made, and the list of exhibits prepared.

Any matters concerning the exhibition should be addressed to HAYDN SMITH, 12, Gilroy Way, Orpington.

Stephenson Locomotive Society

A Sheffield centre was inaugurated at an enthusiastic meeting held on January 10th last and attended by the chairman and secretary of the society's north-western area which has headquarters in Manchester. Further gatherings were arranged to take place at approximately monthly intervals. Prospective members or others interested are invited to contact Mr. G. J. Thomas, 8, Watson Road, Sheffield, 10. After the business part of the inaugural meeting, Mr. B. Roberts gave a short lantern lecture on " The Isle of Man Railway." Successful joint meetings are held from time to time in conjunction with kindred bodies at Coventry, Derby and elsewhere.

By courtesy of British Railways, visits for members to locomotive works and running sheds have been arranged on a considerable scale during the spring and summer season, including weekend tours. London headquarters as well as the principal English and Scottish provincial centres organise these fixtures and members can usually participate in any of their choice.

Bethnal Green S.M.E.E.

The above society still meets regularly twice weekly. We are anxious to contact local locomotive enthusiasts—2½-in. to 5-in. gauge—as we have a project in hand which should prove interesting to them. Any model enthusiasts always welcome at our meetings.

Hon. Secretary: B. R. FOREMAN, 14, Talwin Street, London, E.3.

Guildford Model Yacht, Power Boat and Engineering Society

At the recent annual general meeting of the above society the main item of business was a request that the M.E. and P.B. sections of the society be constituted as one self-contained section within the society. After much debate, this was finally agreed to. Present and future members will now join either the M.E. and P.B., or the model yacht, sections.

An exhibition is to be held in September, but no regatta is to be held at Guildford this year.

Our workshop is greatly appreciated and the new brazing equipment is in much demand.

The passenger-carrying model railway is in much demand, too.

Hon. General Secretary: W. E. ROBERTS, Cannock, 52, Saffron Platt, Guildford.

Reading Society of Model and Experimental Engineers

At recent meetings, the above society's president reviewed progress on his extensive outdoor model railway, and, together with Mr. Morris who gave hints on locomotive construction at a later date emphasised the benefits of stud contact over normal methods of current collection.

The club exhibition will be held in Palmer Hall, West Street, Reading, from April 11th to 14th. Full details from the Hon. Secretary, J. SHAYLER, 14, Westwood Road, Tilehurst, Reading.

Aylesbury and District Society of Model Engineers

The society met as usual on the third Wednesday in February at its headquarters, Hampden Buildings, Temple Square. The evening was devoted to a model night, and was an overwhelming success, every member present bringing along some little work-piece he was making. The beginnings of two new locomotives were shown for the first time, as well as a rebuild of an " old faithful." The majority of work in the club seems to be on locomotives, though a very fine model caravan was on show.

The evening was also blessed by an unexpected visit from Mr. H. D. Bond, secretary of the Luton and District Society of Model Engineers, whom we are always glad to see among us.

Hon. Secretary: E. H. SMITH, Mulberry Tree Cottage, Devonshire Avenue, Amersham, Bucks.

Eltham and District Locomotive Society

The next meeting will take place on Thursday, April 5th, 1951, at the Beehive Hotel, Eltham, which will be the annual general meeting. Members are asked to attend this meeting, if possible, as several items concerning the coming year's activities are down for discussion. It has been decided to hold a club track day on Saturday, May 26th, at the permanent track, Elliott's Sports Ground, Avery Hill Road, Eltham, for society's members and families; also, friends are cordially invited. Tea will be arranged for.

Members are specially asked to notify the secretary as to the number of friends that will attend in order to make the necessary arrangements.

At the last meeting, Mr. Dutton, the chairman, gave another of his very interesting talks on workshop problems which was greatly appreciated.

Applications are now coming in for the society's portable track and locomotives for the summer season.

At the moment the following are arranged : Royal Artillery Garden Fete, Woolwich, June 9th; Alpha Cement Ltd., Grays, Essex, July 21st.

Visitors are cordially invited to the meetings.

Hon. Secretary: F. BRADFORD, 19, South Park Crescent, S.E.6.

Harrow and Wembley Society of Model Engineers

" From Pontoon to Cabin Cruiser " was the subject of a very interesting talk by Mr. S. R. Emery, a marine member, to a well-attended meeting of members and visitors, on March 30th.

Detailed stage by stage, construction of this four-berth 20 ft. craft was described and illustrated with the aid of an episcope and many bits and pieces were brought along for examination. The difficulties that were encountered during construction and the methods used in overcoming them were all the more commendable to Mr. Emery on completing a very fine, compact and well-appointed boat.

The winter has been spent in carrying out modifications and improvements, and with launching day very near, many pleasant trips are being planned on the upper reaches of the river.

Hon. Secretary: C. E. SALMON 11, Brook Drive, Harrow.